JSC-48500-3A

International Space Station Operations Checklist

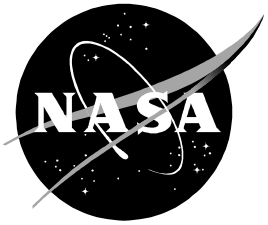
ISS-3A

Mission Operations Directorate
Operations Division

Preliminary, Rev B
April 17, 1998

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas



USA
United Space Alliance

INTERNATIONAL SPACE STATION OPERATIONS CHECKLIST ISS-3A

PRELIMINARY, REVISION B
April 17, 1998

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This document is not currently under the configuration control of the Systems Operations Data File Control Board (SODFCB). During the interim, changes may be submitted directly to the appropriate file manager.

ACKNOWLEDGEMENTS

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INTEGRATED ASSEMBLY PROCEDURES

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N1-1 CONFIGURATION PRE 3A UMBILICAL OPERATIONS

1. DEACTIVATE IMV FAN

PCS Node 1: ECLSS: Aft Port IMV Fan
'Node 1 Aft Port IMV Fan'

cmd Off **Execute**
√Status - Off

NOTE
Verify EPCS configured for both MDMs.

2. VERIFY MDM STATES

PCS2 Tasks: 3A Assembly Config
3A Assembly Config
'Primary NCS'

√MDM ID - N1-2
√Major State - Primary
√Frame Count - <incrementing>

'Secondary NCS'

√MDM ID - N1-1
√Major State - Secondary

****
* If states are not correct, do not execute *
* this procedure, √**MCC-H**. *
****

3. DISABLE NCS AUTO RETRY
'Primary NCS'

√Auto Retry - Inh
If Auto Retry - Ena
cmd Auto Retry - Inh
√Auto Retry - Inh

4. TRANSITION N1-1 TO DIAGNOSTIC

NOTE
1. Expect PCS FDA 'CDH MDM N1-2 detected RT fail MDM N1-1 - PMA1'.
2. The Node 1/PMA 1 Shell A Heater setpoints will default to very low values, rendering them inoperable. (Recovery will occur after this procedure is complete.)

'N1-1 MDM'
√Auth Xtion Diagnostic State - Enable

If Auth Xtion Diagnostic State - Disable
cmd Auth Xtion Diagnostic State - Ena
√Auth Xtion Diagnostic State - Enable
cmd N1-1 MDM - Transition to Diagnostic State

5. REMOVE POWER TO N1-1 MDM SDO CARD
'N1-1 SDO Card Power'

cmd RPCM N1RS1 A RPC 5 - Op
√Pos - Op
√Tripped - No

6. REMOVE N1-1 MDM POWER AT RPC

NOTE
Expect PCS FDA (LED, message only) when MDM power removed.

'N1-1 MDM Power'

cmd RPCM N1 RS1 A RPC 11 - Op
√Pos - Op
√Tripped - No

7. DISABLE RT DEVICES I/O ON EPS BUSES
'Primary NCS UB EPS N1 14 RPCM'

cmd N1RS1 A - Inh
cmd N1RS1 B - Inh
cmd N1RS1 C - Inh

√RT Inhibit 20, 19, 18 (three) - X

8. POWER DOWN RACU 6

NOTE
RACU commands sent from orbiter will not work if FGB relay matrix is in **MCC-M** command state.

SM 204 FGB

√COMMANDING - INH (Moscow commanding)

If COMMANDING - INH

RUSSIAN GROUND	AOS	LOS
Pass 1	___/___:___:___	___/___:___:___
Pass 2	___/___:___:___	___/___:___:___

Shuttle ⇓ **MCC-H**: "Ready for RACU 6 powerdown."
MCC-H ⇒ **MCC-M**: "Go for RACU 6 Power Off."
MCC-M ⇒ **MCC-H**: "RACU 6 Powered Off at ___/___:___:___ GMT."

If COMMANDING - ENA (crew commanding)
MCC-M ⇒ **MCC-H**: "Go for RACU 6 Power Off."
MCC-H ⇑ shuttle: "Go for RACU 6 Power Off."

On MCC GO:

PCS Tasks: 3A Assembly Config
3A Assembly Config

cmd RACU 6 - Off

Shuttle ⇓ **MCC-H**: "RACU 6 Power Off at ___/__:__:___ GMT."

On MCC GO or when RACU 6 commanded Off:
√RACU 6 Power - Off
√Input Current < 2.0
√Output Current: 0.00A
√Output Voltage: 0.00V

9. CONNECT STRING 1 UMBILICAL BUNDLES

IV Notify EVA crew: "RACU 6 Off. Go for String 1 umbilical connections."

NOTE
EV connects Node 1 String 1 umbilicals per EVA procedure.

N1-1 CONFIGURATION POST 3A UMBILICAL OPERATIONS

1. VERIFY FGB POWER GENERATION STATUS
   On EV GO:

PCS2 Tasks: 3A Assembly Config
3A Assembly Config
'FGB EPS'

√Main Bus Volts 1,2 (two): 28.0 --- 29.0
√Battery 1 Volts 1 thru 6 (six) > 25.5

****
* If any Battery Voltage < 25.5 V *
* Notify **MCC-H**: "FGB batteries low." *
* Wait 1 revolution for FGB battery charge. *
****

2. COMMAND RACU 6 ON

SM 204 FGB

√COMMANDING - INH (Moscow commanding)

If COMMANDING - INH

RUSSIAN GROUND	AOS	LOS
Pass 1	___/___:___:___	___/___:___:___
Pass 2	___/___:___:___	___/___:___:___

Shuttle ⇓ **MCC-H**: "Ready for RACU 6 Power On."
MCC-H ⇒ **MCC-M**: "Go for RACU 6 Power On."
MCC-M ⇒ **MCC-H** ⇑ shuttle: "RACU 6 Power On at ___/__:__:__."

If COMMANDING - ENA (crew commanding)
Shuttle ⇓ **MCC-H**: "Ready for RACU 6 Power On."
MCC-M ⇒ **MCC-H**: "Go for RACU 6 Power On."
MCC-H ⇑ shuttle: "Moscow Go for RACU 6 Power On."

On MCC GO:

PCS2 3A Assembly Config
'FGB EPS'

cmd RACU 6 Power - On

√RACU 6 Power - On
√Input Current > 3.0 A
√Output Current > 0.3 --- 10 A
√Output Voltage: 121 --- 125 V

NOTE
Output current should be 0.5 A at power on. Current could be as high as 10 A after MDM initialization (approximately 2.5 minutes), depending on heater usage.

Shuttle ⇓ **MCC-H**: "RACU 6 Power On at ___/__:__:__ GMT."

****
* If Output Current > 10 Amps *
* **cmd** RACU 6 - Off *
* √**MCC-H** *
* ********** *

3. VERIFY MDM STATES
'Primary NCS'

√MDM ID - N1-2
√MDM State - Primary
√Frame Count - <incrementing>

'Secondary NCS'

√MDM ID - N1-1
√MDM State - Standby
√Frame count - <incrementing>

4. COMMAND N1-1 TO SECONDARY
'N1-1 MDM'

cmd Secondary State - Transition
√Frame Count - <incrementing>
√Major State - Secondary

****
* If Major State not correct, √**MCC-H**. *
****

5. ENABLE RT DEVICE I/O ON EPS BUSES

****
* If N1-2 powerdown will be delayed *
*   *
*   'Primary NCS'   *
*   *
*   **cmd** Auto Retry - Ena   *
*   √Auto Retry - Enable   *
****

'Primary NCS UB EPS N1 14 RPCM'

cmd N1RS1 A - Ena
cmd N1RS1 B - Ena
cmd N1RS1 C - Ena
√RT Inhibit 20, 19, 18 (three) - <blank>

NOTE
MCC will command the Aft Port IMV Fan On.

6. PROVIDE POWER TO N1-1 MDM SDO CARD

'N1-1 SDO Card Power'

cmd RPCM N1RS1 A RPC 5 - Cl
√Pos - Cl
√Tripped - No

Z1 HEATER ACTIVATION - STRING 1

1. ENABLE STRING 1 Z1 RT DEVICE I/O

PCS2 Tasks: 3A Assembly Config

3A Assembly Config

'Primary NCS UB EPS N1 14 RPCM'

cmd Z14B A - Ena
cmd Z14B B - Ena
√RT Inhibit 12, 11 (two) - <blank>

2. ACTIVATE STRING 1 Z1 HEATERS

PCS2 Tasks: USOS POWERDOWN POWER UP - DISPLAY 1

USOS POWERDOWN POWER UP - DISPLAY 1

'DDCU Htr RPCM Z14B B'

cmd RPC 11,16 (two) - Cl
√Pos 11,16 (two) - Cl
√Tripped 11,16 (two) - No

'PCU and PCU 1 Htr RPCM Z14B'

cmd Htr RPC 14 - Cl
√Pos - Cl
√Trip Stat - No

'CMG Htrs RPCM Z14B B'

cmd RPC 10,12 (two) - Cl
√Pos 10,12 (two) - Cl
√Trip Stat 10,12 (two) - No

'EEATCS Htr RPCM Z14B B'

cmd RPC 7 - Cl
√Pos 7 - Cl
√Trip Stat 7 - No

'KU-Band Htr RPCM Z14B B'

cmd RPC 5,6 (two) - Cl
√Pos 5,6 (two) - Cl
√Trip Stat 5,6 (two) - No

'S-Band Htrs RPCM Z14B B'

cmd RPC 1,4 (two) - Cl
√Pos 1,4 (two) - Cl
√Trip Stat 1,4 (two) - No

3. ENABLE STRING 1 SPDA RAIL HEATERS
'SPDA Rail Htrs - A'

cmd Z13B - Htr A Ena Opr
√Status - Ena Opr

'SPDA Rail Htrs - B'

cmd Z14B - Htr B Ena Opr
√Status - Ena Opr

N1-2 CONFIGURATION PRE 3A UMBILICAL OPERATIONS

NOTE
Verify EPCS configured for both MDMs.

1. VERIFY MDM STATES

PCS2 Tasks: 3A Assembly Config

3A Assembly Config

'Primary NCS'

MDM ID - N1-2
√Major State - Primary
√Frame Count - <incrementing>

'Secondary NCS'

√MDM ID - N1-1
√Major State - Secondary

****
* If states are not correct, do not execute *
* this procedure, √**MCC-H**. *
****

2. INHIBIT NCS AUTO RETRY

'Secondary NCS'

√Auto Retry - Inh
If Auto Retry - Ena
cmd Auto Retry - Inh
√Auto Retry - Inh

3. COMMAND N1-2 TO DIAGNOSTIC

On MCC GO

NOTE
1. N1-1 MDM will go to Primary when N1-2 goes to Diagnostic.
2. The Node 1/PMA 1 Shell B Heater setpoints will default to very low values, rendering them inoperable. (Recovery will occur after this procedure is complete.)

'N1-2 MDM'

√Auth Xtion Diagnostic State - Enable
If Auth Xtion Diagnostic State - Disable
cmd Auth Xtion Diagnostic State - Enable
√Auth Xtion Diagnostic State - Enable

NOTE
1. Expect ‘Disconnect’ message on PCS2. 2. Expect possible ‘S62 PDI DECOM FAIL’ message.

cmd N1-2 - Transition to Diagnostic State
√Major State - Diagnostics
√N1-2 Frame Count - <static>
Wait 1 minute, proceed (Allows N1-1 to go to Primary)

4. TELEMETRY RECOVERY ON OIU

CRT SM 212 OIU

BUS 4 BC - ITEM 15 EXEC (*)
BUS 3 RT - ITEM 10 EXEC (*)
Change OIU N1 Physical Device to N1-1 - ITEM 18 +4 EXEC

Wait 1 minute from diagnostic command.

NOTE
Expect possible ‘S62 PDI DECOM FAIL’ message.

CRT Reload OIU FORMAT 2 - ITEM 1 +2 EXEC

5. TELEMETRY RECOVERY ON PCS

NOTE
Expect PCS FDA ‘CDH MDM N1-1 Detected RT Fail MDM N1-2 - PMA1’.

PCS1 sel Arrow above ‘PCS’ logo
sel Start/Restart PCS CDS
sel Icon to open PCS CDS Main Control Panel Window, enlarge
(may be buried behind displays)
√Status Box - yellow

sel ‘Connect to MDM’
√Status Box - green
Verify ‘connected to MDM’ indicated.

If displays not loaded
sel arrow above ‘PCS’ logo
sel Start PCS CDDF display

Home page will display when load complete (~1 minute).

PCS Tasks: 3A Assembly Config
3A Assembly Config
'Primary NCS'

√MDM ID - N1-1
√MDM State - Primary
√Frame Count - <incrementing>

6. VERIFY N1-2 IN DIAGNOSTIC

3A Assembly Config
'Secondary NCS'

√Frame Count - <static>

7. POWER OFF MDM SDO CARD
'N1-2 SDO Card Power'

RPCM N1RS2 C RPC 3 - Op
√Pos - Op
√Tripped - No

8. POWER OFF N1-2 MDM
'N1-2 MDM'

cmd RPCM N1 RS2 C RPC 13 - Op
√Pos - Op
√Tripped - No

9. DISABLE RT DEVICE I/O ON EPS BUSES
'Primary NCS UB EPS N1 23 RPCM'

cmd N1RS2 A - Inh
cmd N1RS2 B - Inh
cmd N1RS2 C - Inh

√RT Inhibit 20, 19, 18 (three) - X

If PMA 3 Umbilicals to be connected

'Primary NCS UB EPS N1 23 RPCM'

cmd Z13B A - Inh
cmd Z13B B - Inh
√RT Inhibit 12,11 (two) - X

10. POWER DOWN RACU 5

NOTE
RACU commands sent from orbiter will not work if FGB relay matrix is in **MCC-M** command state.

CRT SM 204 FGB

√COMMANDING - INH (Moscow commanding)
If COMMANDING - INH

RUSSIAN GROUND	AOS	LOS
Pass 1	___/___:___:___	___/___:___:___
Pass 2	___/___:___:___	___/___:___:___

Shuttle ⇓ **MCC-H**: "Ready for RACU 5 powerdown."
MCC-H ⇒ **MCC-M**: "Go for RACU 5 Power Off."
MCC-M ⇒ **MCC-H**: "RACU 5 Powered Off at __/__:__:__ GMT."

If COMMANDING - ENA (crew commanding)

MCC-M ⇒ **MCC-H**: "Go for RACU 5 Power Off."
MCC-H ⇑ shuttle: "Moscow Go for RACU 5 Power Off."

On MCC GO:

PCS1 3A Assembly Config

cmd RACU 5 Power - Off
Shuttle ⇓ **MCC-H**: "RACU 5 Power Off at ___/__:__:__ GMT."

On MCC GO or when RACU 5 commanded Off

PCS1 3A Assembly Config

√RACU 5 Power - Off
√Input Current < 2.0 A
√Output Current: 0.00 A
√Output Voltage: ~0.00 V

11. CONNECT STRING 2 UMBILICAL BUNDLES

IV EVA crew: "RACU 5 Off. Go for String 2 umbilical connections."

NOTE
EV connects Node 1 String 2 umbilicals per EVA procedure.

N1-2 CONFIGURATION POST 3A UMBILICAL OPERATIONS

1. VERIFY FGB POWER GENERATION STATUS
   On EV GO:

PCS1 Tasks: 3A Assembly Config
3A Assembly Config
'FGB EPS'

√Main Bus Volt 1,2 (two): 28.0 --- 29.0
√Battery Voltage 1 thru 6 (six) > 25.5

****
* If any Battery Voltage < 25.5 V *
* Notify **MCC-H**: "FGB Batteries low." *
* Wait 1 revolution for FGB battery charge. *
****

2. COMMAND RACU 5 ON

SM 204 FGB

√COMMANDING - INH (Moscow commanding)

If COMMANDING - INH

RUSSIAN GROUND	AOS	LOS
Pass 1	___/___:___:___	___/___:___:___
Pass 2	___/___:___:___	___/___:___:___

Shuttle ⇓ **MCC-H**: "Ready for RACU 5 Power On."
MCC-H ⇒ **MCC-M**: "Go for RACU 5 Power On."
MCC-M ⇒ **MCC-H** ⇑ shuttle: "RACU 5 Power On at ___/__:__:__."

If COMMANDING - ENA (crew commanding)
Shuttle ⇓ **MCC-H**: "Ready for RACU 5 Power On."
MCC-M ⇒ **MCC-H**: "Go for RACU 5 Power On."
MCC-H ⇑ shuttle: "Moscow Go for RACU 5 Power On."

On MCC GO:

PCS1 3A Assembly Config
'FGB EPS'

cmd RACU 5 Power - On

√RACU 5 Power - On

√Input Current > 3.0 A
√Output Current > 0.3 A
√Output Voltage: 121 --- 125

NOTE
Output current should be 0.5 at power on. Current could be as high as 10 A after MDM initialization (approximately 2.5 minutes), depending on heater usage.

Shuttle ⇓ **MCC-H**: "RACU 5 Power On at ___/__:__:__ GMT."

****
* If Output Current > 10 A *
* **cmd** RACU 5 - Off *
* √**MCC-H** *
****

3. VERIFY MDM STATES
'Primary NCS'

√MDM ID - N1-1
√Major State - Primary
√Frame Count - <incrementing>

'Secondary NCS'

√MDM ID - N1-2
√Major State - Standby
√Frame Count - <incrementing>

4. COMMAND N1-1 TO SECONDARY
'N1-1 MDM'

cmd Secondary State - Transition
√Frame Count - <static>

NOTE
N1-2 will go to Primary in 20 seconds.

5. TELEMETRY RECOVERY ON OIU

NOTE
Expect 'S62 PDI DECOM FAIL' message.

CRT | SM 212 OIU |

BUS 3 BC - ITEM 11 EXEC
BUS 4 RT - ITEM 14 EXEC
Change OIU N1 Phys Dev to N1-2 - ITEM 18 +3 EXEC
Reload OIU FORMAT - ITEM 1 +2 EXEC

6. TELEMETRY RECOVERY ON PCS

PCS2 sel icon to open PCS CDS Main Control Panel Window
√Status box - yellow

sel 'Connect to MDM'
√Status box - green
Verify 'connected to MDM' indicated

7. VERIFY MDM STATES

PCS2 'Primary NCS'

√MDM ID - N1-2
√MDM State - Primary
√Frame Count - <incrementing>

'Secondary NCS'

√MDM ID - N1-1
√MDM State - Secondary
√Frame Count - <incrementing>

```
**************************************
*  If States are not correct or no   *
*    N1-2 telemetry, √MCC-H          *
**************************************
```

8. ENABLE RT DEVICE I/O ON EPS BUSES

'Primary NCS UB EPS N1 23 RPCM'

PCS2 **cmd** N1RS2 A - Ena
cmd N1RS2 B - Ena
cmd N1RS2 C - Ena
√RT Inhibit 20, 19, 18 (three) - <blank>

9. ENABLE NCS AUTO RETRY

'Secondary NCS'

cmd Auto Retry - Ena
√Auto Retry - Enable

10. PROVIDE POWER TO N1-2 MDM SDO CARD

'N1-2 SDO Card Power'

cmd RPCM N1RS2 C RPC 3 - Cl
√Pos - Cl
√Tripped - No

11. REACTIVATE EARLY COMM HEATERS

NOTE
The Early Comm equipment powered by Stbd CBM RPCs.

'ECOMM Heaters'

cmd N1RS1 C RPC 6,13 (two) - Cl
√Pos 6,13 (two) - Cl
√Tripped 6,13 (two) - No

cmd N1RS1 A RPC 5 - Cl
√Pos 5 - Cl
√Tripped 5 - No

Z1 HEATER ACTIVATION - STRING 2

1. ENABLE STRING 2 Z1 RT DEVICE I/O

PCS1 Tasks: 3A Assembly Config

3A Assembly Config

'Primary NCS UB EPS N1 23 RPCM'

cmd Z13B A - Ena
cmd Z13B B - Ena
√RT Inhibit 12, 11 (two) - <blank>

2. ACTIVATE STRING 2 Z1 HEATERS

PCS1 Tasks: 3A Assembly Configuration

3A Assembly Config

PCS1 USOS POWERUP/POWERDOWN - DISPLAY 1

USOS POWERUP/POWERDOWN - DISPLAY 1

'DDCU Htr RPCM Z13B B'

cmd RPC 6,11 (two) - Cl
√Pos 6,11 (two) - Cl
√Trip Stat 6,11 (two) - No

'PCU 1 and PCU Htr 2 RPCM Z13B B'

cmd Htr RPC 16 - Cl
√Pos 16 - Cl
√Trip Stat 16 - No

'CMG Htrs RPCM Z13B B'

cmd RPC 10,12 (two) - Cl
√Pos 10,12 (two) - Cl
√Trip Stat 10,12 (two) - No

'EEATCS Htr RPCM Z13B B'

cmd RPC 7 - Cl
√Pos 7 - Cl
√Trip Stat 7 - No

3. ENABLE STRING 2 SPDA RAIL HEATERS
   'SPDA Rail Htrs - A'

   cmd Z14B - Htr A Ena Opr
   √Status - Ena Opr

   'SPDA Rail Htrs - B'

   cmd Z13B - Htr B Ena Opr
   √Status- Ena Opr

Z1 HEATER DEACTIVATION - STRING 2

1. DEACTIVATE STRING 2 Z1 HEATERS

PCS1 USOS POWERDOWN POWERUP - DISPLAY 1

USOS POWERDOWN POWERUP - DISPLAY 1

'DDCU Htr RPCM Z13B B'

cmd RPC 6,11 (two) - Op
√Pos 6,11 (two) - Op
√Trip Stat 6,11 (two) - No

'PCU and Htr RPCM Z13B B'

cmd RPC 16 - Op
√Pos 16 - Op
√Trip Stat 16 - No

'CMG Htrs RPCM Z13B B'

cmd RPC 10,12 (two) - Op
√Pos 10,12 (two) - Op
√Trip Stat 10,12 (two) - No

'EEATCS Htr RPCM Z13B B'

cmd RPC 7 - Op
√Pos 7 - Op
√Trip Stat 7 - No

2. INHIBIT STRING 2 SPDA RAIL HTRS

'SPDA Rail Htrs - A'

cmd Z14B - Htr A Inh
√Status - Inhibit

'SPDA Rail Htrs - B'

cmd Z13B - Htr B Inh
√Status - Inhibit

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ACTIVATION & CHECKOUT PROCEDURES

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C&DH PROCEDURES

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EPCS SETUP

1. UNSTOW PCS

TBD PCS - Two Thinkpads
Two 25-foot DC PWR cables
If Shuttle AFD
- Two 6-foot DC PWR SPLY cables
- Two ORB 1553 Data cables
- US DC PWR SPLY

If ISS RS
- 1553 Data/power Cable
- RS DC PWR SPLY

2. VERIFY POWER OFF

If Shuttle AFD

Pwr Sply √PCS1 DC PWR SPLY PWR switch - Off
√PCS2 DC PWR SPLY PWR switch - Off

See UTILITY OUTLET PLUG-IN PLAN ORBIT CONFIGURATION (REF DATA FS, UTIL PWR) for DC UTIL PWR outlet availability

TBD √DC UTIL PWR - Off
PDIP √PDIP UTIL PWR - Off

If ISS RS

TBD √RS Power switch - Off

3. MAKE PCS POWER AND DATA CABLE CONNECTIONS

√1553 PC Card, Adapter Cable inserted in PC slot in both PCSs

If Shuttle AFD

Connect both 25-foot DC PWR SPLY cables to PCS1,2 DC PWR outlet DC PWR SPLY outlet (J2).

TBD Connect PCS1 6-foot Orb DC PWR SPLY cable to DC UTIL PWR outlet DC PWR SPLY outlet (J1).

PDIP Connect PCS2 6-foot Orb DC PWR SPLY cable to PDIP UTIL PWR outlet DC PWR SPLY outlet (J1).

PDIP Connect PCS1 Orb 1553 Data cable to (PDIP Data Port 1?) outlet 1553 PC Card Adapter Cable.

Connect PCS2 Orb 1553 Data cable to (PDIP Data Port 2?) outlet 1553 PC Card Adapter Cable.

If ISS RS

TBD Connect 1553 Data/Power Cable to PCR outlet DC PWR SPLY outlet (J1) 1553 PC Card Adapter Cable.
Connect RS Power Cable to the IOA outlet.

4. TURN ON PCS

If Shuttle AFD

TBD — DC UTIL PWR → On

Pwr Sply — PCS1 DC PWR SPLY PWR switch → On (Lt On)

PDIP — PDIP UTIL PWR → On

Pwr Sply — PCS2 DC PWR SPLY PWR switch → On (Lt On)

PCS — PCS 1,2 Thinkpad PWR switches → On

If ISS RS

TBD — RS Power switch → On

PCS — PCS Thinkpad PWR switch → On

NOTE

Let the PCS cycle through the initialization screens without any keystroke inputs. System boot takes approximately 3 to 4 minutes. Defaults are preset to select Solaris operating system and boot PCS Command and Display System Files.

5. CONNECT PCS TO MDM DATA (IF MDMS ARE UP AND RUNNING)

PCS2 — After bootup when taskbar appears at bottom of display

sel Arrow directly above 'PCS' logo (as required)

sel Start/Restart PCS CDS (as required)

sel Icon to open PCSCDS Main Control Panel Window (as required)

√Status Box is Green and 'Connected' is displayed in the PCSCDS Main Control Panel Window (as required)

Iconify PCSCDS Main Control Panel Window

```
* ********************************************************************** *
*  If Status Box is not Green, select 'Connect to MDM' button            *
*    if the MDMs are on                                                  *
* ********************************************************************** *
```

NOTE

1. PCS connection to MDM is indicated by 'Green' in the Status Box and/or 'Connected' message displayed in the PCSCDS Main Control Panel Window only when the Prime Node MDM is up and running.

2. If MDMs are not up and running and step 5 is executed Expect a PCS 'CW Server Error Msg' and a 'CDS Signon Fail'.

3. After connected to the MDMs if the PCS receives a Disconnect message open the PCSCDS Main Control Panel Window and select 'Connect to MDM' button to Reconnect. If no joy close all displays and anything iconified and redo Step 5. If still no joy, perform the Loss PCS Malfunction Procedure.

6. CONFIGURE PCS FOR NODE 1 DISPLAYS (AS REQUIRED)
   sel Arrow above 'PCS' logo
   sel Start PCS CDDF display

   After approximate 1 minute,
   √'Increment 2A Home Page' is displayed.

   Displays may now be selected as desired.

   Inform **MCC-H** when complete.

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ECLSS PROCEDURES

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NODE 1 CABIN FAN ACTIVATION R2

1. VERIFY APCU AND RPCM STATUS

SSP1 (L12U)

If Crew Performing
- √APCU 1,2 CONV tb - gray
- √OUTPUT tb - gray

If Ground Performing
- √APCU 1,2 OUT VOLTS RES LOW ≥ 122 Volts

2. VERIFY RPCM STATUS

EPCS

Node 1: EPS: RPCM N14B [X] [X] = 1 2 … 18

RPCM N14B [X]

√RPC [X] Position - Open

Repeat

SMOKE DETECTOR SD 2 ACTIVATION

EPCS

Node 1: ECLSS: SD2

Node 1 Smoke Detector 2

3. sel RPCM N13B A RPC 16

RPCM N13B A RPC 16

√Close Cmd - Ena

√**MCC-H**

cmd Close **Execute**

√Position - Cl

NOTE

If using time tagged commands, allow a minimum 2 second delay between the close RPC command and the monitor enable command to allow the smoke detector voltages to stabilize.

Node 1 Smoke Detector 2

4. **cmd** Monitor Status - Enable **Execute**

√Active BIT Inprog - True

Wait at least 3 seconds, then

√Active BIT Inprog x- False
√Active BIT Fail - Operational
√Obscuration, % Contam ~0
√Scatter, % obs/m ~0
√Monitor Status - Mon

EPCS Node 1: ECLSS: FDIR
Node 1 FDIR

5. **cmd** Node 1-1 MDM Fire Isolation Status - Enable **Execute**
√Node 1-1 MDM Fire Isolation Status - Ena

6. **cmd** Node 1-2 MDM Fire Isolation Status - Enable **Execute**
√Node 1-2 MDM Fire Isolation Status - Ena

ACTIVATE NODE 1 CABIN FAN

EPCS 7. Node 1: ECLSS: cab fan
Node 1 Cabin Fan

sel RPCM N14B B RPC 17

RPCM N14B B RPC 17

√Close Cmd - Ena

√**MCC-H**

cmd Close **Execute**
√Position - Cl

Node 1 Cabin Fan

8. **cmd** On **Execute**
√State - On
√Limit Status - Ena
√Speed, rpm: TBD --- TBD
√dP, mmHg: TBD --- TBD

NOTE
The Cabin fan speed must be set to a lower speed for Node air scrubbing.

9. If fan activation is for Node air scrubbing
cmd 3400 rpm **Execute**
Wait 10 seconds, then
√Speed, rpm: 2956 --- 3844 rpm

SMOKE DETECTOR SD 1 ACTIVATION

EPCS 10. Node 1: ECLSS: SD1
Node 1 Smoke Detector 1

sel RPCM N14B C RPC 03

RPCM N14B C RPC 03

√Close Cmd - Ena

√**MCC-H**

cmd Close **Execute**
√Position - Cl

NOTE
If using time tagged commands, allow a minimum 2 second delay between the close RPC command and the monitor enable command to allow the smoke detector voltages to stabilize.

Node 1 Smoke Detector 1

11. **cmd** Monitor Status - Enable **Execute**
√Active BIT Inprog - True

Wait at least 3 seconds, then
√Active BIT Inprog - False
√Active BIT Fail - Operational
√Obscuration, % Contam ~0
√Scatter, % obs/m ~0
√Monitor Status - Mon

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EPS PROCEDURES

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APCU ACTIVATION

WARNING

To prevent damage to the internal converters and the relay, the APCU output relay must not be opened or closed under load. A load exists when the converter is On (Converter – On (tb – gray)).

CRT SM 200 APCU Status

1. VERIFY PAYLOAD PRIMARY MAIN C ON

R1 √PL PRI MNC tb - On

2. VERIFY PAYLOAD CABIN BUS ON

√PL CAB - MNA

3. VERIFY SWITCH POWER

SSP2 (L12L) √SW PWR CB1 - On
SSP1 (L12U) √SW PWR CB2 - On

4. CLOSE APCU OUTPUT RELAY

√APCU1(2) CONV tb - bp
APCU1(2) OUTPUT → On

5. TURN APCU CONVERTER ON

APCU1(2) CONV → On
√APCU1(2) CONV tb - gray
√APCU1(2) OUTPUT tb - gray

CRT SM 200 APCU Status

√APCU1(2) OUT VOLTS RES LOW ≥ 122

6. ENABLE RT DEVICES I/O ON LAB BUSES

Node 1: C&DH: MDM N1-1
Secondary NCS MDM Node1

sel LB SYS LAB 1
sel RT Status

cmd RPCM_N14B_A_ENA
cmd RPCM_N14B_B_ENA
cmd RPCM_N14B_C_ENA

√RT Inhibit 20,19,18 (three) - Ena

7. ENABLE RT DEVICES I/O ON LAB BUSES
   Node 1: C&DH: MDM N1-2
   Primary NCS MDM Node2

   sel LB SYS LAB 2
   sel RT Status

   cmd RPCM_N13B_A_ENA
   cmd RPCM_N13B_B_ENA
   cmd RPCM_N13B_C_ENA

   √RT Inhibit 20,19,18 (three) - Ena

APCU DEACTIVATION

1. DISABLE RT DEVICES I/O ON EPS BUSES

PCS

Node 1: C&DH: MDM N1-2

Primary NCS MDM Node1

sel LB_SYS_LAB_2
sel RT Status
sel Inhib_RT Commands

PRIM_NCS_ LB_SYS_LAB_2_Inhib

cmd Inhib_RPCM_N13B_A **Execute**
cmd Inhib_RPCM_N13B_B **Execute**
cmd Inhib_RPCM_N13B_C **Execute**

RT_Status
√RT Inhibit 18, 19, 20 (three) - Inh

2. DISABLE RT DEVICES I/O ON LAB BUSES

Node 1: C&DH: MDM N1-1

Secondary NCS MDM Node1

sel LB SYS LAB 1
sel RT Status

cmd Inhib_RPCM_N14B_A **Execute**
cmd Inhib_RPCM_N14B_B **Execute**
cmd Inhib_RPCM_N14B_C **Execute**

√RT Inhibit 20, 19, 18 (three) – Inh

CAUTION

To prevent damage to the internal converters and the relay, the APCU output relay must not be opened or closed under load. A load exists when the converter is On (Converter - On (tb - gray)).

CRT

SM 200 APCU Status

3. TURN APCU CONVERTER OFF

SSP1 (L12U)

APCU1(2) CONV → Off
√APCU1(2) CONV tb - bp
√APCU1(2) OUTPUT tb - bp

4. OPEN APCU OUTPUT RELAY

APCU1(2) OUTPUT → Off

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TCS PROCEDURES

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PMA 3 SHELL HEATER ACTIVATION AND CHECKOUT

NOTE
This procedure requires 340 W of power.

1. CHECK PMA SHELL TEMPERATURES AND CONFIGURE HEATERS

PCS Node 1: TCS

Node 1:TCS

sel PMA 3

PMA 3

If all PMA 3 Htr Temperatures are below 15.5° C

sel PMA 3 Htr Availability

PMA3 Htr Availability

cmd Htr1B Availability - Ena Operate
√Htr1B Availability - Ena Opr
cmd Htr3B Availability - Ena Operate
√Htr3B Availability - Ena Opr
cmd Htr5B Availability - Ena Operate
√Htr5B Availability - Ena Opr

cmd Htr2A Availability - Ena Backup
cmd Htr4A Availability - Ena Backup

sel PMA 3 TCS Overview

NOTE
Attention symbols will appear next to all above heaters and associated ‘PMA 3 Heater [X] Failed’ messages will be entered into advisory log.

Heaters 2A and 4A will cycle to “Enable to Operate” mode and turn on.

√Htr 2A Availability - Ena Opr
√Htr 4A Availability - Ena Opr

Verify PMA 3 Htr1B icon energized.
Verify PMA 3 Htr2A icon energized.
Verify PMA 3 Htr3B icon energized.
Verify PMA 3 Htr4A icon energized.
Verify PMA 3 Htr5B icon energized.

If all PMA 3 Htr Temperatures are not below 15.5° C

√**MCC-H**

2. DEACTIVATE HEATERS
On MCC-H GO:

cmd Htr1B Availability - Inhibit
√Htr1B Availability - Inh
cmd Htr3B Availability - Inhibit
√Htr3B Availability - Inh
cmd Htr5B Availability - Inhibit
√Htr5B Availability - Inh

cmd Htr2A Availability - Inhibit
√Htr2A Availability - Inh
cmd Htr4A Availability - Inhibit
√Htr4A Availability - Inh

NOMINAL PROCEDURES

NOMINAL

C&DH PROCEDURES

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CONFIG C&DH FOR ORBITER UNDOCKING WHILE N1- 2(1) PRIMARY

1. INHIBIT ORB BUS N1-2(1) AUTO SWITCHOVER

PCS2(1) Node 1: C&DH: MDM N1-2(1)

Primary NCS MDM Node 1

'MDM ID:'

sel UB Orb N1 2(1)
sel Bus Status

UB_Orb_Bus_Status

√N1_2(1)_MDM_UB_ORB_N1_2(1)_Ch_Sw_Inhib_Stat - <blank> (ENA)

If X (INH) go to step 2

sel Bus Commands

N1_2(1)_MDM_UB_ORB_N1_2(1)

cmd Inhib_Auto_AB_Ch_Sw **Exec**

UB_Orb_Bus_Status

√N1_2(1)_MDM_UB_ORB_N1_2(1)_Ch_Sw_Inhib_Stat - X (INH)

2. INHIBIT RT FDIR

'MDM ID:'

sel UB Orb N1 2(1)
sel RT Status

UB_Orb_RT_Status

√RT FDIR Inhibited 8, 9, 24, 25 – <blank> (ENA)
If all checked RTs X (INH) >>

sel Inhib_FDIR_RT Commands

N1_2(1)_MDM_UB_ORB_N1_2(1)_Inhib_FDIR

cmd Inhib_FDIR_FGB_MDM_1 **Exec**
cmd Inhib_FDIR_FGB_MDM_2 **Exec**
cmd Inhib_FDIR_OIU_1 **Exec**
cmd Inhib_FDIR_OIU_2 **Exec**

N1_2(1)_MDM_UB_ORB_N1_2(1)_Inhib_FDIR

√RT FDIR Inhibited 8, 9, 24, 25 - X (INH)

Inform **MCC-H** procedure is complete.

CONFIG C&DH AFTER ORBITER UNDOCKING WHILE N1-2(1) PRIMARY

1. ENABLE RT FDIR
   Node 1: C&DH: MDM N1-2(1)
   'MDM ID:'

   sel UB Orb N1 2(1)
   sel RT Status

   UB_Orb_RT_Status

   √RT FDIR Inhibited 8, 9, 24, 25 - X (INH)

   If all checked RTs are blank (ENA) go to step 2

   sel Ena_FDIR_RT Commands

   N1_2(1)_MDM_UB_ORB_N1_2(1)_Ena_FDIR

   cmd Ena_FDIR_FGB_MDM_1 **Exec**
   cmd Ena_FDIR_FGB_MDM_2 **Exec**
   cmd Ena_FDIR_OIU_1 **Exec**
   cmd Ena_FDIR_OIU_2 **Exec**

   N1_2(1)_MDM_UB_ORB_N1_2(1)_Ena_FDIR

   √RT FDIR Inhibited 8, 9, 24, 25 - <blank> (ENA)

2. ENABLE ORB BUS N1-2(1) AUTO SWITCHOVER
   Primary NCS MDM Node 1
   'MDM ID:'

   sel UB Orb N1 2(1)
   sel Bus Status

   UB_Orb_Bus_Status

   √N1_2(1)_MDM_UB_ORB_N1_2(1)_Ch_Sw_Inhib_Stat - <blank> (INH)

   If blank (ENA) >>

   sel Bus Commands

   N1_2(1)_MDM_UB_ORB_N1_2(1)

   cmd Ena_Auto_AB_Ch_Sw **Exec**

UB_Orb_Bus_Status

√N1_2(1)_MDM_UB_ORB_N1_2(1)_Ch_Sw_Inhib_Stat - <blank> (ENA)

NCS DATA LOAD PROCEDURE

1. VERIFY TIME CONSTRAINTS FOR DATA LOAD

NOTE
1. Determine if the Load requires a continuous uplink session or can be done with ZOEs. 2. Verify if the selected communications path supports performing the load in a reasonable amount of time for the MDM checksum safing response to be disabled.

2. LOG MDM CHECKSUMS
   sel Software Health
   record CSCI Version ID _____

3. SELECT LOAD IMAGE FILE TO UPLINK

DNAV Command Inventory: Data Load Preparation
Data Load Preparation

sel Select Load File
Navigate to the load image file you want to uplink
If load image file is a PPL
√Version - <is correct version>

NOTE
The user must select the proper version of the load image file. There will be separate files for loads to DRAM and EEPROM. For PPLs there is only one file. For Adapation data there may be multiple files for a single update. For Software loads there may be only one large file.

√Destination Device - (N1-1,N1-2, N1 Primary, N1 Secondary)

If load is to DRAM
√Memory Location - DRAM

If load is to EEPROM
√Memory Location - EEPROM

√Start Address
Should correspond to the address specified in the VDD.
√Word Count
Should correspond to the size specified in the VDD.

Optional
√Metering Rate - should be 1.00 for OIU cmd path, .67 for Early Comm
input Priority - (None, High, Urgent, Critical)
input Uplink after: (time to uplink data load after)
input Uplink by: (time to perform uplink by)
input Remarks: (Remarks to FMT Manager)

sel Submit to FMT

4. COORDINATION WITH THE FMT MANAGER

DVIS Call ODIN on the FMT DVIS loop to coordinate Uplink request. ODIN will perform MDM configuration and uplink of data load.

5. VIEWING LOAD STATUS

CDDT Node 1: C&DH: Primary(Secondary) MDM

NODE 1:C&DH:MDM:Primary(Secondary)

√Frame Count - <incrementing>
MDM is operational.

NOTE

Checksum errors may occur during the load process.

sel MDM BIT Status
√BST A word # 24 - X
√BST A word # 2 - X

DNAV Uplink Manager

Uplink FMT Manager

√FMT_Load_Status- 100% complete
Record Data Load Commands _____

6. MAKING DATA LOAD PERMANENT

Repeat this procedure if also loading to EEPROM.

NCS DATA DUMP PROCEDURE

1. VERIFY TIME CONSTRAINTS FOR A DATA DUMP

NOTE
Determine if the Dump requires a continuous uplink session or can be done with ZOEs. Verify if the selected communications path supports performing the dump in a reasonable amount of time.

2. BUILDING A DATA DUMP COMMAND
   If you want to select an already saved data dump command go to step 3.

DNAV — Command Inventory: Data Dump Preparation
Data Dump Preparation

input OpsName (Required if you want to save the command in command inventory)
sel Source Device
Choose device from the list.

Optional
If you want to perform a dump of the NCS diagnostic buffer collection list buffer, sel Diagnostic Dump.

input Start Address
Enter the starting address for the dump.

input Word Count
Enter the size of the data dump.

If the data dump is from DRAM
√Memory Type - DRAM

If the data dump is from EEPROM
√Memory Type - EEPROM

Optional
If you want to receive the data only once
sel One-Shot Delivery

Optional
input Priority - (None, High, Urgent, Critical)
input Uplink after: (time to uplink data load after)
input Uplink by: (time to perform uplink by)
input Remarks: (Remarks to FMT Manager)

input Save Dump to File
Select path/filename to save data dump to.

sel Select Dump File
Navigate to the directory you want to save the dump file to and select the filename.

sel Submit to FMT
Go to step 5.

3. SELECTING AN USER BUILT DATA DUMP REQUEST

DNAV Command Inventory: Data Dump Command Inventory
Data Dump Command Inventory

Select the data dump command to uplink.
sel Uplink

4. COORDINATION WITH THE FMT MANAGER

DVIS Call ODIN on the FMT DVIS loop to coordinate the downlink request. ODIN will perform the data dump.

5. VIEWING THE DUMP STATUS

CDDT Node 1: C&DH: Primary(Secondary) MDM
NODE 1:C&DH:MDM:Primary(Secondary)

√Frame Count - <incrementing>
MDM is operational

√Dump Pipe - <open>

DNAV Downlink Manager
Downlink FMT Manager

√FMT Dump Status - 100% complete

REINITIALIZE NODE 1 MDMs

1. VERIFY MDM STATES AND MDM IDS

PCS2(1) Node 1: C&DH: MDM N1-2(1)
PRIMARY NCS MDM Node 1

√STATE - Primary
√MDM ID - N1-2(1)

PCS2(1) Node 1: C&DH: MDM N1-1(2)
SECONDARY NCS MDM Node 1

√Frame Count - <static>

PCS2(1) Node 1: C&DH: MDM N1-2(1)
PRIMARY NCS MDM Node 1
'Software Control'

sel Transmit Mode Code

Primary_NCS_Transmit_Mode_Code

sel Primary NCS Xmt Mode Code Commands
cmd Xmt_Stat_Word_Tmplt
enter Bus ID - 2
enter RT Address - 6(5) **Execute**
√Subsystem Flag Set - X (set)

If Subsystem Flag Bit is set, N1-1(2) MDM is in Diagnostic State and is ready to accept diagnostic commands.

If Reinitialize MDM from EEPROM, go to step 3,
If Reinitialize MDM from DRAM, go to step 2.

2. PERFORM MDM REINITIALIZATION FROM DRAM

PCS2(1) Node 1: C&DH: MDM N1-2(1)
PRIMARY NCS MDM Node 1
'Software Control'

sel MDM Utilities
sel Commands

NOTE
1. Startup process will execute from the UAS currently loaded in DRAM.
2. No POST is performed.

cmd N1_1(2)_MDM_Re_Init_MDM_DRAM **Execute**

Wait 60 seconds for MDM to reinitialize.

Go to step 4.

3. PERFORM MDM REINITIALIZATION FROM EEPROM

PCS2(1) Node 1: C&DH: MDM N1-2(1)

PRIMARY NCS MDM Node 1

'Software Control'

sel MDM Utilities
sel Commands

NOTE

1. Reinitialize MDM from EEPROM will cause the loss of all current information in the DRAM such as BST, current Bus, RT, and application configurations.

2. All UAS and default Configuration Tables will be loaded from EEPROM.

3. Normal POST will also be performed.

cmd N1_1(2)_MDM_Re_Init_MDM_EEPROM **Execute**

Wait 60 seconds for MDM to reinitialize.

4. VERIFY MDM STATE AFTER REINITIALIZATION

PCS2(1) Node 1: C&DH: MDM N1-1(2)

SECONDARY NCS MDM Node 1

√Frame Count - <incrementing>

'MDM Major State:'

√STATE - Standby
√MDM ID - N1-1(2)

****
* If state is not Standby, √**MCC** *
****

5. ENABLE NCS AUTO RETRY

PCS2(1) Node 1: C&DH: MDM N1-2(1)

PRIMARY NCS MDM Node 1

'Software Control'

sel MDM Utilities

√Primary_NCS_Auto_Retry_Ena - <blank> (inhibited)

If X (enable) >>

sel Commands

cmd Primary_NCS_Ena_NCS_Retry **Execute**

√Primary_NCS_Auto_Retry_Ena - X (enable)

EPCS DEACTIVATION

1. POWER DOWN PCS
   Close all display windows.

   At the Taskbar on bottom of Display,
   sel EXIT.

   On 'Logout Confirmation' window,
   sel OK.

   When 'Type any key to continue' appears

PCS — PCS 1, 2 Thinkpad PWR switches → Off

PWR SPLY — PCS1 DC PWR SPLY PWR switch → Off (Lt off)
PCS2 DC PWR SPLY PWR switch → Off (Lt off)

TBD — DC UTIL PWR → Off

PDIP — PDIP UTIL PWR → Off

2. DISCONNECT EPCS POWER AND DATA CABLE

PDIP — Disconnect both Orb 1553 Data cables to (PDIP Data Ports 1, 2) outlet
1553 PC Card Adapter Cable

Disconnect both 6 foot Orb DC PWR SPLY cable to DC UTIL PWR outlet
DC PWR SPLY outlet (J1)

Disconnect both 25 foot DC PWR SPLY cable to EPCS DC PWR outlet
DC PWR SPLY outlet (J2)

3. STOW PCS

TBD — PCS - Two Thinkpads
Two DC PWR SPLYs
Two 25 foot DC PWR cables
Two 6 foot DC PWR SPLY cables
Two ORB 1553 Data Cables

CHANGE NCS CONFIGURATION

1. VERIFY HEALTH AND STATUS OF MDM

PCS Node 1: C&DH: Primary(Secondary) MDM

NODE 1: C&DH: MDM: Primary(Secondary)

√Frame Count - <incrementing>
MDM is operational.
√MDM BIT Status - <blank>
No MDM errors.

'MDM Major State'

√STATE - Primary(Secondary)
MDM is operational.

'Configuration'

√Configuration - current configuration

NOTE

The possible NCS configurations are:
1 = Flight 2A configuration
2 = Flight 1R configuration
3 = Flight 3A configuration
4 = Flight 4A configuration
5 = Flight 5A configuration (pre CCS activation)
6 = Flight 5A configuration (post CCS activation)
7 = Flight 13A configuration

2. SEND COMMAND TO CHANGE CONFIGURATION

To change the configuration for the Primary NCS

PCS Node 1: C&DH: Primary MDM

NODE 1: C&DH: MDM: Primary

sel Configuration
cmd Prim_NCS_Sel_Config_[X] **Execute** [X] = New config
sel Close

NOTE

The MDM will perform a warm restart. The secondary MDM will then become the Primary MDM.

PCS Node 1: C&DH: Secondary MDM

NODE 1: C&DH: MDM: Secondary

√Frame Count - <incrementing>
MDM is operational.

√MDM BIT Status - <blank>
No MDM errors.

'MDM Major State'

√STATE - Primary(Secondary)
MDM is operational.

'Configuration'

√Configuration - current configuration

Perform MDM transition procedure to transition Secondary MDM to Primary if required.

Go to step 3.

To change the configuration for the Secondary NCS

PCS Node 1: C&DH: Secondary MDM

NODE 1: C&DH: MDM: Secondary

sel Configuration
cmd Second_NCS_Sel_Config_[X] **Execute** [X] = New config
sel Close

NOTE
The MDM will perform a warm restart. The secondary MDM will then become the Primary MDM.

PCS Node 1: C&DH: Secondary MDM

NODE 1: C&DH: MDM: Secondary

√Frame Count - <incrementing>
MDM is operational.
√MDM BIT Status - <blank>
No MDM errors.

'MDM Major State'

√STATE - Primary(Secondary)
MDM is operational.

'Configuration'

√Configuration - current configuration

3. VERIFY STATUS OF THE NEW CONFIGURATION

PCS Node 1: C&DH: Primary(Secondary) MDM

NODE 1: C&DH: MDM: Primary(Secondary)

If Configuration 2 was selected
- If Primary MDM
  - sel CB_GNC_ [X] bus [X] = 1 for N1-1 or 2 for N1-2
  - sel RT Status
  - √RT Inhibited 22,23,24 - <blank>
  - sel UB_EPS_N1_14 bus
  - sel RT Status
  - √RT Inhibited 18,19,20 - <blank>
  - sel UB_EPS_N1_23 bus
  - sel RT Status
  - √RT Inhibited 18,19,20 - <blank>
  - sel UB_ORB_N1_[X] bus [X] = 1 for N1-1 or 2 for N1-2
  - sel RT Status
  - √RT Inhibited 8,24 - <blank>
- If Secondary MDM
  - sel UB_ORB_N1_[X] bus [X] = 1 for N1-1 or 2 for N1-2
  - sel RT Status
  - √RT Inhibited 8 - <blank>

If Configuration 3 was selected
- If Primary MDM
  - sel CB_GNC_ [X] bus [X] = 1 for N1-1 or 2 for N1-2
  - sel RT Status
  - √RT Inhibited 22,23,24 - <blank>
  - If N1-2 MDM
    - sel LB_SYS_LAB_2 bus
    - sel RT Status
    - √RT Inhibited 18,19,20 - <blank>
  - sel UB_EPS_N1_14 bus
  - sel RT Status
  - √RT Inhibited 11,12,18,19,20 - <blank>
  - sel UB_EPS_N1_23 bus
  - sel RT Status
  - √RT Inhibited 11,12,18,19,20 - <blank>
  - sel UB_ORB_N1_[X] bus [X] = 1 for N1-1 or 2 for N1-2
  - sel RT Status
  - √RT Inhibited 8,24 - <blank>

If Secondary MDM
If N1-2 MDM
sel LB_SYS_LAB_2 bus
sel RT Status
√RT Inhibited 18,19,20 - <blank>

sel UB_ORB_N1_[X] bus [X] = 1 for N1-1 or 2 for N1-2
sel RT Status
√RT Inhibited 8 - <blank>

If Configuration 4 was selected
If Primary MDM
sel CB_GNC_ [X] bus [X] = 1 for N1-1 or 2 for N1-2
sel RT Status
√RT Inhibited 22,23,24 - <blank>

If N1-1 MDM
sel LB_SYS_LAB_1 bus
sel RT Status
√RT Inhibited 18,19,20 - <blank>

If N1-2 MDM
sel LB_SYS_LAB_2 bus
sel RT Status
√RT Inhibited 15,16,17,18,19,20 - <blank>

sel UB_EPS_N1_14 bus
sel RT Status
√RT Inhibited 11,12,18,19,20,23,28 - <blank>

sel UB_EPS_N1_23 bus
sel RT Status
√RT Inhibited 11,12,18,19,20,23,28 - <blank>

sel UB_ORB_N1_[X] bus [X] = 1 for N1-1 or 2 for N1-2
sel RT Status
√RT Inhibited 8,24 - <blank>

If Secondary MDM
If N1-1 MDM
sel LB_SYS_LAB_1 bus
sel RT Status
√RT Inhibited 18,19,20 - <blank>

If N1-2 MDM
sel LB_SYS_LAB_2 bus
sel RT Status
√RT Inhibited 18,19,20 - <blank>

sel UB_ORB_N1_[X] bus [X] = 1 for N1-1 or 2 for N1-2
sel RT Status
√RT Inhibited 8 - <blank>

If Configuration 5 was selected
If Primary MDM
sel CB_GNC_ [X] bus [X] = 1 for N1-1 or 2 for N1-2
sel RT Status
√RT Inhibited 22,23,24,27,28,29,30 - <blank>

If N1-1 MDM
sel LB_SYS_LAB_1 bus
sel RT Status
√RT Inhibited 5,9,18,19,20,21, 29,30 - <blank>

If N1-2 MDM
sel LB_SYS_LAB_2 bus
sel RT Status
√RT Inhibited 5,9,18,19,20, 29,30 - <blank>

sel UB_EPS_N1_14 bus
sel RT Status
√RT Inhibited 11,12,18,19,20,23,28 - <blank>

sel UB_EPS_N1_23 bus
sel RT Status
√RT Inhibited 11,12,18,19,20,23,28 - <blank>

sel UB_ORB_N1_[X] bus [X] = 1 for N1-1 or 2 for N1-2
sel RT Status
√RT Inhibited 8,24 - <blank>

If Secondary MDM
sel CB_GNC_ [X] bus [X] = 1 for N1-1 or 2 for N1-2
sel RT Status
√RT Inhibited 27,28,29,30 - <blank>

If N1-1 MDM
sel LB_SYS_LAB_1 bus
sel RT Status
√RT Inhibited 5,9,18,19,20,21,29,30 - <blank>

If N1-2 MDM
sel LB_SYS_LAB_2 bus
sel RT Status
√RT Inhibited 5,9,18,19,20, 29,30 - <blank>

sel UB_ORB_N1_[X] bus [X] = 1 for N1-1 or 2 for N1-2
sel RT Status
√RT Inhibited 8 - <blank>

~

If Configuration 6 was selected

If Primary MDM

sel CB_GNC_ [X] bus [X] = 1 for N1-1 or 2 for N1-2
sel RT Status
√RT Inhibited 28,29,30 - <blank>

sel LB_SYS_LAB_[X] bus [X] = 1 for N1-1 or 2 for N1-2
sel RT Status
√RT Inhibited 29,30 - <blank>

sel UB_EPS_N1_14 bus
sel RT Status
√RT Inhibited 11,12,18,19,20,23,28 - <blank>

sel UB_EPS_N1_23 bus
sel RT Status
√RT Inhibited 11,12,18,19,20,23,28 - <blank>

sel UB_ORB_N1_[X] bus [X] = 1 for N1-1 or 2 for N1-2
sel RT Status
√RT Inhibited 8 - <blank>

If Secondary MDM

sel CB_GNC_ [X] bus [X] = 1 for N1-1 or 2 for N1-2
sel RT Status
√RT Inhibited 28,29,30 - <blank>

sel LB_SYS_LAB_[X] bus [X] = 1 for N1-1 or 2 for N1-2
sel RT Status
√RT Inhibited 29,30 - <blank>

sel UB_ORB_N1_[X] bus [X] = 1 for N1-1 or 2 for N1-2
sel RT Status
√RT Inhibited 8 - <blank>

4. CHANGE DEFAULT CONFIGURATION

MCC-H - Perform EARLY PREPOSITIONED LOAD procedure using new Station Configuration PPL for both MDMs.

NODE 1 MDM STATE TRANSITIONAL MATRIXES

	N1-2 Transition				
Initial N1-1 State	**Prim => Off, Diag**	**Prim => Stdby**	**Off/Diag => Prim**	**Stdby => Prim**	**Stdby => Diag/Off**
Primary	**1**	**1**	**B**	**B**	**D**
Secondary	**A**	**A**	**1**	**1**	**3**
Standby	**A**	**A**	**1**	**1**	**3**
Diag/Off	**2**	**3**	**C(TBD)**	**1**	**3**

	N1-1 Transition						
Init N1-2 State	**Prim => Sec**	**Prim =>Off/Diag**	**Prim => Stby**	**Sec => Off/Diag/Stby**	**Off/Diag => Prim**	**Off/Diag/Stby => Sec**	**Stby => Off/Diag**
Primary	**1**	**1**	**1**	**G**	**1**	**I**	**J**
Standby	**E**	**F**	**F**	**1**	**1**	**1**	**3**
Diag/Off	**3**	**2**	**3**	**1**	**H(TBD)**	**1**	**3**

ACTIONS

A = Transitioning N1-2 to Dgnstc/Stdby/Off from Prim & N1-1 to Prim from Stby/Sec
B = Transitioning N1-2 to Prim from Off/Dgnstc/Stby while N1-1 is Prim
C = Transitioning N1-2 to Prim from Off/Dgnstc while N1-1 is Off/Dgnstc
D = Transitioning N1-2 to Dgnstc from Stby while N1-1 is Prim
E = Transitioning N1-1 to Sec from Prim & N1-2 to Prim from Stby
F = Transitioning N1-1 to Off/Dgnstc/Stby from Prim & N1-2 to Prim from Stby
G = Transitioning N1-1 to Off/Dgnstc/Stby from Sec while N1-2 is Prim
H = Transitioning N1-1 to Prim from Off/Dgnstc while N1-2 is Off/Dgnstc
I = Transitioning N1-1 to Sec from Off/Dgnstc/Stby while N1-2 is Prim
J = Transitioning N1-1 to Off/Dgnstc from Stby while N1-2 is Prim

RESULTING STATES

N1-1=Prim	**N1-2=Off/Dgnstc/Stby**
N1-1=Sec	**N1-2=Prim**
N1-1=Off/Dgnstc	**N1-2=Prim**
N1-1=Prim	**N1-2=Dgnstc**
N1-1=Sec	**N1-2=Prim**
N1-1=Off/Dgnstc/Stby	**N1-2=Prim**
N1-1=Off/Dgnstc/Stby	**N1-2=Prim**
N1-1=Prim	**N1-2=Off/Dgnstc**
N1-1=Sec	**N1-2=Prim**
N1-1=Off/Dgnstc	**N1-2=Prim**

Notes:

1 = Illegal States
2 = Operationally Feasible, but will lose both boxes at 2 A.
3 = Unstable States. Feasible, but will automatically go back to the original configuration.

A. TRANSITIONING N1-2 TO DIAGNOSTIC/STANDBY/OFF FROM PRIMARY & N1-1 TO PRIMARY FROM SECONDARY/STANDBY

1. VERIFY MDM STATES AND MDM IDS

PCS2 Node 1: C&DH: MDM N1-2
PRIMARY NCS MDM Node 1

√STATE - Primary
√MDM ID - N1-2

PCS2 Node 1: C&DH: MDM N1-1
SECONDARY NCS MDM Node 1

√STATE - Secondary/Standby
√MDM ID - N1-1

NOTE
If states are not correct, do not execute this procedure, √**MCC**.

2. DISABLE NCS AUTO RETRY

PCS2 Node 1: C&DH: MDM N1-1
SECONDARY NCS MDM Node 1
'Software Control'

sel MDM Utilities

Secondary_NCS_MDM_Utilities

√Secondary_NCS_Auto_Retry_Inh - X (inhibited)

If blank (enabled)
sel Commands
cmd Secondary_NCS_Inh_NCS_Retry **Execute**
√Secondary_NCS_Auto_Retry_Inh - X (inhibited)

3. COMMAND N1-2 MDM TO DIAG (N1-1 SHOULD GO TO PRIM)

PCS2 Node 1: C&DH: MDM N1-2
PRIMARY NCS MDM Node 1
'Software Control'

sel MDM FDIR
√Prim_NCS_Cmd_Xsitn_to_Dgnstc_Inh - <blank> (enable)

If X (inhibited)

'MDM Major State'

sel Commands
cmd N1-2_MDM_Cmd_Xsitn_Dgnstc_State_Arm **Execute**

'Software Control'

sel MDM FDIR
√Prim_NCS_Cmd_Xsitn_to_Dgnstc_Inh - <blank> (enable)

NOTE
1. Sending the following command will cause the loss of PCS2, Early COMM, and OIU telemetry until OIU reconfiguration and PCS1 reconnection are done. 2. Possible PDI DECOM Fail message.

'MDM Major State:'

sel Commands
cmd N1-2_MDM_Xsitn_Dgnstc_State **Execute**

PCS2 Node 1: C&DH: MDM N1-2
PRIMARY NCS MDM Node 1

√Frame Count - <static> (loss of PCS2 telemetry)

Wait 1 minute for N1-1 to go to Primary (N1-1 should go to Primary State after 50 seconds).

4. RECOVER TELEMETRY ON PCS1 AND VERIFY N1-1 IS PRIMARY

PCS1 After boot up (as required), task-bar appears at bottom of display
sel Arrow directly above 'PCS' logo
sel Start/Restart PCS CDS
sel Icon to open PCS CDS Main Control Panel Window

√Status Box is Green and 'Connected' is displayed in the PCS CDS Main Control Panel Window

NOTE
PCS1 connection to MDM is indicated by 'Green' in the Status Box and/or 'Connected' message displayed in the PCS1 CDS Main Control.

****
* If Status Box is not Green, select 'Connect to MDM' icon to reconnect. *
* If still no joy, close all displays and all iconified items and repeat this step. *
*
* √**MCC** if Status Box is still not green. *
****

NOTE
C&W tone and TBD C&W message will be generated as N1-1 becomes primary and detects N1-2 fails.

PCS1 Node 1: C&DH: MDM N1-1
PRIMARY NCS MDM Node 1

√Frame Count - <incrementing>

'MDM Major State:'

√MDM ID - N1-1
√MDM State - Primary

5. TELEMETRY RECOVERY ON EARLY COMM (GROUND ONLY)

NOTE
Early COMM should reconnect to N1-1 MDM on the other Orb bus automatically in about 10 seconds after N1-1 MDM becomes Primary.

Node 1: C&DH: MDM N1-1
PRIMARY NCS MDM Node 1

√Frame Count - <incrementing>

'MDM Major State:'

√MDM ID - N1-1
√MDM State - Primary

****
* If Frame Count is Static after 20 seconds from the *
* moment N1-1 becomes Primary (no Early COMM *
* telemetry received), √**MCC** *
****

6. TELEMETRY RECOVERY ON OIU

NOTE
Possible PDI DECOM Fail message.

CRT SM 212 OIU

BUS 4 BC - ITEM 15 EXEC
BUS 3 RT - ITEM 10 EXEC
Change OIU N1 Physical Device to N1-1 - ITEM 18 +4 EXEC

CRT Reload OIU FORMAT 2 - ITEM 1 +2 EXEC

CRT SM 210 NODE

√PHY ID PRI MDM - N1-1
√STATE - PRI
√FAIL - <blank>
√FRM CTR - <incrementing>

7. VERIFY N1-2 IS IN DIAGNOSTIC

PCS1 Node 1: C&DH: MDM N1-2
SECONDARY NCS MDM Node 1

√Frame Count - <static>

PCS1 Node 1: C&DH: MDM N1-1
PRIMARY NCS MDM Node 1
'Software Control'

sel Transmit Mode Code

Primary_NCS_Transmit_Mode_Code

sel Primary NCS Xmt Mode Code Commands
cmd Xmt_Stat_Word_Tmplt
enter Bus ID - 2
enter RT Address - 5 **Execute**
√Subsystem Flag Set - X (set)

If Subsystem Flag Bit is set, N1-2 MDM is in Diagnostic State and is ready to accept diagnostic commands.

If transitioning N1-2 to Diagnostic, >>
If transitioning N1-2 to Standby, go to step 8.
If powering off N1-2, go to step 9.

8. IF TRANSITIONING N1-2 MDM TO STANDBY STATE

PCS1 Node 1: C&DH: MDM N1-1
PRIMARY NCS MDM Node1
'Software Control'

sel MDM Utilities
sel Commands

NOTE
1. Startup process will execute from the UAS currently loaded in DRAM.
2. No POST is performed.

cmd N1_2_MDM_Re_Init_MDM_DRAM **Execute**

Wait 60 seconds for MDM to reinitialize.

PCS1 Node 1: C&DH: MDM N1-2
SECONDARY NCS MDM Node 1

√Frame Count - <incrementing>

'MDM Major State:'

√STATE - Standby
√MDM ID - N1-2

****
* If state is not Standby, √**MCC** *
****

9. IF POWERING OFF N1-2 MDM

PCS1 Node 1: C&DH: MDM N1-2
SECONDARY NCS MDM Node 1
'RPCM _N1RS2_C'

sel RPC 13 (Nod1_2_MDM)

RPCM _N1RS2_C_RPC_13 Detail

sel Commands
cmd Open **Execute**
√Position - Op

B. TRANSITIONING N1-2 TO PRIMARY FROM OFF/DIAGNOSTIC/STANDBY WHILE N1-1 IS PRIMARY

1. VERIFY MDM STATES

PCS1 Node 1: C&DH: MDM N1-1
PRIMARY NCS MDM Node 1

√STATE - Primary
√MDM ID - N1-1

If N1-2 is Off, go to step 2.
If N1-2 is in Diagnostic state, go to step 3.
If N1-2 is in Standby state, go to step 5.

2. IF N1-2 IS INITIALLY OFF, BRING IT TO STANDBY

PCS1 Node 1: C&DH: MDM N1-2
SECONDARY NCS MDM Node 1
'RPCM _N1RS2_C'

sel RPC 13 (Nod1_2_MDM)

RPCM _N1RS2_C_RPC_13 Detail

√Position - Op
sel Commands
cmd Close **Execute**
√Position - Cl

Wait at least 90 seconds for MDM to start up, finish POST, and go to Standby State.

Go to step 4.

3. IF N1-2 IS INITIALLY IN DIAGNOSTIC STATE, BRING IT TO STANDBY

PCS1 Node 1: C&DH: MDM N1-2
SECONDARY NCS MDM Node 1

√Frame Count - <static>

PCS1 Node 1: C&DH: MDM N1-1
PRIMARY NCS MDM Node 1
'Software Control'

sel Transmit Mode Code

Primary_NCS_Transmit_Mode_Code

sel Primary NCS Xmt Mode Code Commands
cmd Xmt_Stat_Word_Tmplt
enter Bus ID - 2
enter RT Address - 5 **Execute**
√Subsystem Flag Set - X (set)

If Subsystem Flag Bit is set, N1-2 MDM is in Diagnostic State and is ready to accept diagnostic commands.

PCS1 Node 1: C&DH: MDM N1-1
PRIMARY NCS MDM Node1
'Software Control'

sel MDM Utilities
sel Commands

NOTE

1. Check with **MCC** for which command to send (reinit from DRAM or EEPROM).

2. For DRAM Reinitialization
   Startup process will execute from the UAS currently loaded in DRAM.
   No POST is performed.

3. For EEPROM Reinitialization
   Reinitialize MDM from EEPROM will cause the loss of all current information in the DRAM such as BST, current Bus, RT, and application configurations.
   All UAS and default Configuration Tables will be loaded from EEPROM.
   Normal POST will be performed.

If reinitialize from DRAM
cmd N1_2_MDM_Re_Init_MDM_DRAM **Execute**

If reinitialize from EEPROM
cmd N1_2_MDM_Re_Init_MDM_EEPROM **Execute**

Wait 60 seconds for MDM to reinitialize.

PCS1 Node 1: C&DH: MDM N1-2
SECONDARY NCS MDM Node 1

√Frame Count - <incrementing>

'MDM Major State:'

√STATE - Standby
√MDM ID - N1-2

****
* If state is not Standby, √**MCC** *
****

4. VERIFY N1-2 IS IN STANDBY STATE

PCS1 Node 1: C&DH: MDM N1-2

SECONDARY NCS MDM Node 1

√Frame Count - <incrementing>

'MDM Major State:'

√MDM State - Standby
√MDM ID - N1-2

5. COMMAND N1-1 TO SECONDARY, (N1-2 SHOULD GO TO PRIMARY)

PCS1 Node 1: C&DH: MDM N1-1

PRIMARY NCS MDM Node 1

NOTE

1. Sending the following command will cause the loss of PCS1, Early COMM, and OIU telemetry until OIU reconfiguration and PCS2 reconnection are done.

2. Possible PDI DECOM Fail message.

'MDM Major State:'

sel Commands
cmd N1-1_MDM_Xsitn_Second_State **Execute**
√Frame Count - <static> (loss of PCS1 telemetry)

N1-2 should go to Primary in 20 seconds.

6. TELEMETRY RECOVERY ON PCS2

PCS2 After boot up when taskbar appears at bottom of display
sel Arrow directly above "PCS" logo
sel Start/Restart PCS CDS
sel Icon to open PCSCDS Main Control Panel Window

√Status Box is Green and 'Connected' is displayed in the PCS CDS Main Control Panel Window.

NOTE

PCS connection to MDM is indicated by 'Green' in the Status Box and/or 'Connected' message displayed in the PCS CDS Main Control Panel Window.

****
* If Status Box is not Green, select 'Connect to MDM' icon *
* to reconnect. *
* If still no joy, close all displays and all iconified items and *
* repeat this step. *
* *
* √**MCC** if Status Box is still not green. *
****

7. VERIFY N1-2 IS PRIMARY AND N1-1 IS SECONDARY

PCS2 Node 1: C&DH: MDM N1-2
PRIMARY NCS MDM Node 1

√Frame Count - <incrementing>

'MDM Major State:'

√MDM ID - N1-2
√MDM State - Primary

PCS2 Node 1: C&DH: MDM N1-1
SECONDARY NCS MDM Node 1

√Frame Count - <incrementing>

'MDM Major State:'

√MDM ID - N1-1
√MDM State - Secondary

* ********** *
* If States are not correct or no N1-2 TLM *
* *
* √**MCC** *
* ********** *

8. TELEMETRY RECOVERY ON EARLY COMM (GROUND ONLY)

NOTE
Early COMM should reconnect to N1-2 MDM on the other Orb bus automatically in about 10 seconds after N1-2 MDM becomes Primary.

Node 1: C&DH: MDM N1-2
PRIMARY NCS MDM Node 1

√Frame Count - <incrementing>

'MDM Major State:'

√MDM ID - N1-2
√MDM State - Primary

* ** *
* If Frame Count is Static after 20 seconds from the *
* moment N1-2 becomes Primary (no Early COMM *
* telemetry received), √**MCC** *
* ** *

9. TELEMETRY RECOVERY ON OIU

NOTE
Possible PDI DECOM Fail message.

CRT SM 212 OIU

BUS 3 BC - ITEM 11 EXEC
BUS 4 RT - ITEM 14 EXEC
Change OIU N1 Physical Device to N1-2 - ITEM 18 +3 EXEC

CRT Reload OIU FORMAT 2 - ITEM 1 +2 EXEC

CRT SM 210 NODE

√PHY ID PRI MDM - N1-2
√STATE - PRI
√FAIL - <blank>
√FRM CTR - <incrementing>

D. TRANSITIONING N1-2 TO DIAGNOSTIC/OFF FROM STANDBY WHILE N1-1 IS PRIMARY

1. VERIFY MDM STATES AND MDM IDS

PCS1 Node 1: C&DH: MDM N1-1
PRIMARY NCS MDM Node 1

√STATE - Primary
√MDM ID - N1-1

PCS1 Node 1: C&DH: MDM N1-2
SECONDARY NCS MDM Node 1

√STATE - Standby
√MDM ID - N1-2

NOTE
If states are not correct, do not execute this procedure, √**MCC**.

2. DISABLE NCS AUTO RETRY

PCS1 Node 1: C&DH: MDM N1-1
PRIMARY NCS MDM Node 1
'Software Control'

sel MDM Utilities

Primary_NCS_MDM_Utilities

√Primary_NCS_Auto_Retry_Inh - X (inhibited)

If blank (enable)
sel Commands
cmd Prim_NCS_Inh_NCS_Retry **Execute**
√Primary_NCS_Auto_Retry_Inh - X (inhibited)

3. COMMAND N1-2 TO DIAGNOSTIC

PCS1 Node 1: C&DH: MDM N1-2
SECONDARY NCS MDM Node 1
'Software Control'

sel MDM FDIR
√Second_NCS_Cmd_Xsitn_to_Dgnstc_Inh - blank (enable)

If X (inhibited)

'MDM Major State'

sel Commands
cmd N1-2_MDM_Cmd_Xsitn_Dgnstc_State_Arm **Execute**

'Software Control'

sel MDM FDIR
√Second_NCS_Cmd_Xsitn_to_Dgnstc_Inh - blank (enable)

'MDM Major State:'

sel Commands
cmd N1-2_MDM_Xsitn_Dgnstc_State **Execute**

4. VERIFY N1-2 IS IN DIAGNOSTIC

PCS1 Node 1: C&DH: MDM N1-2
SECONDRY NCS MDM Node 1

√Frame Count - <static>

PCS1 Node 1: C&DH: MDM N1-1
PRIMARY NCS MDM Node 1
'Software Control'

sel Transmit Mode Code

Primary_NCS_Transmit_Mode_Code

sel Primary NCS Xmt Mode Code Commands
cmd Xmt_Stat_Word_Tmplt
enter Bus ID - 2
enter RT Address - 5 **Execute**
√Subsystem Flag Set - X (set)

If Subsystem Flag Bit is set, N1-2 MDM is in Diagnostic State and is ready to accept diagnostic commands.

If transitioning N1-2 to Diagnostic, >>
If powering off N1-2, go to step 5.

5. POWERING OFF N1-2 MDM

PCS1 Node 1: C&DH: MDM N1-2
SECONDARY NCS MDM Node 1
'RPCM _N1RS2_C'

sel RPC 13 (Nod1_2_MDM)

RPCM _N1RS2_C_RPC_13 Detail

sel Commands
cmd Open **Execute**
√Position - Op

E. TRANSITIONING N1-1 TO SECONDARY FROM PRIMARY & N1-2 TO PRIMARY FROM STANDBY

1. VERIFY MDM STATES AND MDM IDS

PCS1 Node 1: C&DH: MDM N1-1
PRIMARY NCS MDM Node 1

√STATE - Primary
√MDM ID - N1-1

PCS1 Node 1: C&DH: MDM N1-2
SECONDARY NCS MDM Node 1

√STATE - Standby
√MDM ID - N1-2

NOTE
If states are not correct, do not execute this procedure, √**MCC**

2. COMMAND N1-1 TO SECONDARY, (N1-2 SHOULD GO TO PRIMARY)

PCS1 Node 1: C&DH: MDM N1-1
PRIMARY NCS MDM Node 1

NOTE
1. Sending the following command will cause the loss of PCS1, Early COMM, and OIU telemetry until OIU reconfiguration and PCS2 reconnection are done.

2. Possible PDI DECOM Fail message.

'MDM Major State:'

sel Commands
cmd N1-1_MDM_Xsitn_Second_State **Execute**

√Frame Count - <static> (loss of PCS1 telemetry)

N1-2 should go to Primary in 20 seconds.

3. TELEMETRY RECOVERY ON PCS2

PCS2 After boot up, when taskbar appears at bottom of display

sel Arrow directly above 'PCS' logo
sel Start/Restart PCS CDS
sel Icon to open PCS CDS Main Control Panel Window

√Status Box is Green and 'Connected' is displayed in the PCSCDS Main Control Panel Window.

NOTE
PCS2 connection to MDM is indicated by 'Green' in the Status Box and/or 'Connected' message displayed in the PCS2 CDS Main Control.

```
**************************************************************************
*    If Status Box is not Green, select 'Connect to MDM' icon            *
*      to reconnect.                                                     *
*    If still no joy, close all displays and all iconified items and     *
*      repeat this step.                                                 *
*                                                                        *
*  √MCC if Status Box is still not green.                                *
**************************************************************************
```

4. VERIFY N1-2 IS PRIMARY AND N1-1 IS SECONDARY

PCS2 Node 1: C&DH: MDM N1-2

PRIMARY NCS MDM Node 1

√Frame Count - <incrementing>

'MDM Major State:'

√STATE - Primary
√MDM ID - N1-2

PCS2 Node 1: C&DH: MDM N1-1

SECONDARY NCS MDM Node 1

√Frame Count - <incrementing>

'MDM Major State:'

√STATE - Secondary
√MDM ID - N1-1

```
* ************************************************ *
*    If States are not correct or no N1-2 TLM      *
*                                                  *
*  √MCC                                            *
* ************************************************ *
```

5. TELEMETRY RECOVERY ON EARLY COMM (GROUND ONLY)

NOTE
Early COMM should reconnect to N1-2 MDM on the other Orb bus automatically in about 10 seconds after N1-2 MDM becomes Primary.

Node 1: C&DH: MDM N1-2
PRIMARY NCS MDM Node 1

√Frame Count - <incrementing>

'MDM Major State:'

√MDM ID - N1-2
√MDM State - Primary

****
* If Frame Count is Static after 20 seconds from *
* the moment N1-2 becomes Primary (no Early *
* COMM telemetry received), √**MCC** *
****

6. TELEMETRY RECOVERY ON OIU

NOTE
Possible PDI DECOM Fail message.

CRT SM 212 OIU

BUS 3 BC - ITEM 11 EXEC
BUS 4 RT - ITEM 14 EXEC
Change OIU N1 Physical Device to N1-2 - ITEM 18 +3 EXEC

CRT Reload OIU FORMAT 2 - ITEM 1 +2 EXEC

CRT SM 210 NODE

√PHY ID PRI MDM - N1-2
√STATE - PRI
√FAIL - <blank>
√FRM CTR - <incrementing>

F. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC/STANDBY FROM PRIMARY & N1-2 TO PRIMARY FROM STANDBY

1. VERIFY MDM STATES

PCS1 Node 1: C&DH: MDM N1-1
PRIMARY NCS MDM Node 1

√STATE - Primary
√MDM ID - N1-1

PCS1 Node 1: C&DH: MDM N1-2
SECONDARY NCS MDM Node 1

√STATE - Standby
√MDM ID - N1-2

NOTE
If states are not correct, do not execute this procedure, √**MCC**

2. DISABLE NCS AUTO RETRY

PCS1 Node 1: C&DH: MDM N1-2
SECONDARY NCS MDM Node 1
'Software Control'

sel MDM Utilities

Primary_NCS_MDM_Utilities

√Secondary_NCS_Auto_Retry_Inh - X (inhibited)

If blank (enable)
sel Commands
cmd Second_NCS_Inh_NCS_Retry **Execute**
√Secondary_NCS_Auto_Retry_Inh - X (inhibited)

3. COMMAND N1-1 TO DIAGNOSTIC

PCS1 Node 1: C&DH: MDM N1-1
PRIMARY NCS MDM Node 1
'Software Control'

sel MDM FDIR
√Prim_NCS_Cmd_Xsitn_to_Dgnstc_Inh - <blank> (enable)
If X (inhibited)

'MDM Major State'

sel Commands
cmd N1-1_MDM_Cmd_Xsitn_Dgnstc_State_Arm **Execute**
sel MDM FDIR
√Prim_NCS_Cmd_Xsitn_to_Dgnstc_Inh - <blank> (enable)

NOTE
1. Sending the following command will cause the loss of PCS1, Early COMM, and OIU telemetry until OIU reconfiguration and PCS2 reconnection are done. 2. Possible PDI DECOM Fail message.

'MDM Major State:'

sel Commands
cmd N1-1_MDM_Xsitn_Dgnstc_State **Execute**
√Frame Count - <static> (loss of PCS telemetry)

N1-2 should go to Primary State after 20 seconds.

4. TELEMETRY RECOVERY ON PCS2

PCS2 After boot up, when taskbar appears at bottom of display
sel Arrow directly above 'PCS' logo
sel Start/Restart PCS CDS
sel Icon to open PCS CDS Main Control Panel Window

√Status Box is Green and 'Connected' is displayed in the PCS2 CDS Main Control Panel Window

NOTE
PCS2 connection to MDM is indicated by 'Green' in the Status Box and/or 'Connected' message displayed in the PCS2 CDS Main Control Panel Window.

****
* If Status Box is not Green, select 'Connect to MDM' icon *
* to reconnect. *
* If still no joy, close all displays and all iconified items and *
* repeat this step. *
* *
* √**MCC** if Status Box is still not green. *
****

5. TELEMETRY RECOVERY ON EARLY COMM (GROUND ONLY)

NOTE
Early COMM should reconnect to N1-2 MDM on the other Orb bus automatically in about 10 seconds after N1-2 MDM becomes Primary.

Node 1: C&DH: MDM N1-2
PRIMARY NCS MDM Node 1

√Frame Count - <incrementing>

'MDM Major State:'

√MDM ID - N1-2
√MDM State - Primary

****
* If Frame Count is Static after 20 seconds from *
* the moment N1-2 becomes Primary (no Early *
* COMM telemetry received), √**MCC** *
****

6. TELEMETRY RECOVERY ON OIU

NOTE
Possible PDI DECOM Fail message.

CRT SM 212 OIU

BUS 3 BC - ITEM 11 EXEC
BUS 4 RT - ITEM 14 EXEC
Change OIU N1 Physical Device to N1-2 - ITEM 18 +3 EXEC

CRT Reload OIU FORMAT 2 - ITEM 1 +2 EXEC

CRT SM 210 NODE

√PHY ID PRI MDM - N1-2
√STATE - PRI
√FAIL - <blank>
√FRM CTR - <incrementing>

7. VERIFY N1-2 IS PRIAMRY AND N1-1 IS IN DIAGNOSTIC

PCS2 Node 1: C&DH: MDM N1-1
SECONDARY NCS MDM Node 1

√Frame Count - <static>

PCS2 Node 1: C&DH: MDM N1-2
PRIMARY NCS MDM Node 1

√Frame Count - <incrementing>

'MDM Major State:'

√STATE - Primary
√MDM ID - N1-2

sel Transmit Mode Code

Primary_NCS_Transmit_Mode_Code

sel 'Primary NCS Xmt Mode Code Commands'
cmd Xmt_Stat_Word_Tmplt
enter Bus ID - 2
enter RT Address - 6 **Execute**
√Subsystem Flag Set - X (set)

If Subsystem Flag Bit is set, N1-1 MDM is in Diagnostic State and is ready to accept diagnostic commands.

If transitioning N1-1 to Diagnostic, >>
If powering off N1-1, go to step 8.
If transitioning N1-1 to Standby, go to step 9.

8. POWERING OFF N1-1 MDM

PCS2 Node 1: C&DH: MDM N1-1
SECONDARY NCS MDM Node 1
'RPCM _N1RS1_A'

sel RPC 11 (Nod1_1_MDM)

RPCM _N1RS2_A_RPC_11 Detail

√Position - Cl
sel Commands
cmd Open **Execute**
√Position - Op

If powering N1-1 off, >>

9. TRANSITIONING N1-1 TO STANDBY STATE

PCS2 Node 1: C&DH: MDM N1-2
PRIMARY NCS MDM Node 1
'Software Control'

sel MDM Utilities
sel Commands

NOTE
1. Startup process will execute from the UAS currently loaded in DRAM. 2. No POST is performed.

cmd N1_1_MDM_Re_Init_MDM_DRAM **Execute**

Wait 60 seconds for MDM to reinitialize.

PCS2 Node 1: C&DH: MDM N1-1
SECONDARY NCS MDM Node 1

√Frame Count - <incrementing>

'MDM Major State:'

√STATE - Standby
√MDM ID - N1-1

****
* If state is not Standby, √**MCC** *
****

G. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC/STANDBY FROM SECONDARY WHILE N1-2 IS PRIMARY

1. VERIFY MDM STATES

PCS2 Node 1: C&DH: MDM N1-2
PRIMARY NCS MDM Node 1

√STATE - Primary
√MDM ID - N1-2

PCS2 Node 1: C&DH: MDM N1-1
SECONDARY NCS MDM Node 1

√STATE - Secondary
√MDM ID - N1-1

NOTE
If states are not correct, do not execute this procedure, √**MCC**.

If transitioning N1-1 to standby, go to step 2.
If transitioning N1-1 to Diagnostic or Powering N1-1 off, go to step 3.

2. TRANSITIONING TO STANDBY STATE

PCS2 Node 1: C&DH: MDM N1-1
SECONDARY NCS MDM Node 1
'MDM Major State:'

sel Commands
cmd Second_NCS_Xsitn_Stby_State **Execute**
√N1-1 MDM State - Standby

If transitioning N1-1 to Standby, >>

3. DISABLE NCS AUTO RETRY

PCS2 Node 1: C&DH: MDM N1-2
PRIMARY NCS MDM Node 1
'Software Control'

sel MDM Utilities

Primary_NCS_MDM_Utilities

√Primary_NCS_Auto_Retry_Inh - X (inhibited)

If blank (enable)
sel Commands
cmd Primary_NCS_Inh_NCS_Retry **Execute**
√Primary_NCS_Auto_Retry_Inh - X (inhibited)

4. TRANSITIONING N1-1 TO DIAGNOSTIC

PCS2 Node 1: C&DH: MDM N1-1
SECONDARY NCS MDM Node 1
'Software Control'

sel MDM FDIR
√Second_MDM_Cmd_Xsitn_to_Dgnstc_Inh - <blank> (enable)

If X (inhibited)

'MDM Major State:'

sel Commands
cmd N1-1_MDM_Cmd_Xsitn_Dgnstc_State_Arm **Execute**

'Software Control'

sel MDM FDIR
√Second_MDM_Cmd_Xsitn_to_Dgnstc_Inh - <blank> (enable)

'MDM Major State:'

sel Commands
cmd N1-1_MDM_Xsitn_Dgnstc_State **Execute**

If transitioning N1-1 to Diagnostic, >>
If powering N1-1 off, go to step 5.

5. POWERING OFF N1-1 MDM

PCS2 Node 1: C&DH: MDM N1-1
SECONDARY NCS MDM Node 1
'RPCM _N1RS1_A'

sel RPC 11 (Nod1_1_MDM)

RPCM _N1RS1_A_RPC_11 Detail

√Position - Cl
sel Commands
cmd Open **Execute**
√Position - Op

I. TRANSITIONING N1-1 TO SECONDARY FROM OFF/DIAGNOSTIC/ STANDBY WHILE N1-2 IS PRIMARY

1. VERIFY MDM STATE

PCS2 Node 1: C&DH: MDM N1-2
PRIMARY NCS MDM Node 1

√STATE - Primary
√MDM ID - N1-2

If N1-1 is Off, go to step 2.
If N1-1 is in Diagnostic state, go to step 3.
If N1-1 is in Standby state, go to step 5.

2. IF N1-1 IS INITIALLY OFF, BRING IT TO STANDBY

PCS2 Node 1: C&DH: MDM N1-1
SECONDARY NCS MDM Node 1
'RPCM _N1RS1_A'

sel RPC 11 (Nod1_1_MDM)

RPCM _N1RS1_A_RPC_11 Detail

√Position - Op
sel Commands
cmd Close **Execute**
√Position - Cl

Wait at least 90 seconds for MDM to start up, finish POST, and go to Standby.

Go to step 4.

3. IF N1-1 IS INITIALLY IN DIAGNOSTIC STATE, BRING IT TO STANDBY

PCS2 Node 1: C&DH: MDM N1-1
SECONDARY NCS MDM Node 1

√Frame Count - <static>

PCS2 Node 1: C&DH: MDM N1-2
PRIMARY NCS MDM Node 1
'Software Control'

sel Transmit Mode Code

Primary_NCS_Transmit_Mode_Code

sel Primary NCS Xmt Mode Code Commands
cmd Xmt_Stat_Word_Tmplt
enter Bus ID - 2
enter RT Address - 6 **Execute**
√Subsystem Flag Set - X (set)

If Subsystem Flag Bit is set, N1-2 MDM is in Diagnostic State and is ready to accept diagnostic commands.

PCS2 Node 1: C&DH: MDM N1-1
PRIMARY NCS MDM Node 1
'Software Control'

sel MDM Utilities
sel Commands

NOTE
1. Check with **MCC** for which command to send (reinit from DRAM or EEPROM).

2. For DRAM Reinitialization
   Startup process will execute from the UAS currently loaded in DRAM.
   No POST is performed.

3. For EEPROM Reinitialization
   Reinitialize MDM from EEPROM will cause the loss of all current information in the DRAM such as BST, current Bus, RT, and application configurations.
   All UAS and default Configuration Tables will be loaded from EEPROM.
   Normal POST will be performed.

If reinitialize from DRAM
cmd N1_1_MDM_Re_Init_MDM_DRAM **Execute**

If reinitialize from EEPROM
cmd N1_1_MDM_Re_Init_MDM_EEPROM **Execute**

Wait 60 seconds for MDM to reinitialize.

4. VERIFY N1-1 IS IN STANDBY STATE

PCS2 Node 1: C&DH: MDM N1-1
SECONDARY NCS MDM Node 1

√Frame Count - <incrementing>

'MDM Major State:'

√N1-1 MDM State - Standby

√MDM ID - N1-1

****
* If state is not Standby, √**MCC** *
****

5. COMMAND N1-1 TO SECONDARY

PCS2 Node 1: C&DH: MDM N1-1
SECONDARY NCS MDM Node 1
'MDM Major State:'

sel Commands
cmd N1-1_MDM_Xsitn_Second_State **Execute**

6. VERIFY N1-1 IS SECONDARY

PCS2 Node 1: C&DH: MDM N1-1
SECONDARY NCS MDM Node 1

√Frame Count - <incrementing>

'MDM Major State:'

√MDM State - Secondary
√MDM ID - N1-1

****
* If State is not correct *
* *
* √**MCC** *
****

J. TRANSITIONING N1-1 TO OFF/DIAGNOSTIC FROM STANDBY WHILE N1-2 IS PRIMARY

1. VERIFY MDM STATES

PCS2 Node 1: C&DH: MDM N1-2
PRIMARY NCS MDM Node 1

√STATE - Primary
√MDM ID - N1-2

PCS2 Node 1: C&DH: MDM N1-1
SECONDARY NCS MDM Node 1

√STATE - Standby
√MDM ID - N1-1

NOTE
If states are not correct, do not execute this procedure, √**MCC**

2. DISABLE NCS AUTO RETRY

PCS2 Node 1: C&DH: MDM N1-2
PRIMARY NCS MDM Node 1
'Software Control'

sel MDM Utilities

Primary_NCS_MDM_Utilities

√Primary_NCS_Auto_Retry_Inh - X (inhibited)
If blank (enable)
sel Commands
cmd Primary_NCS_Inh_NCS_Retry **Execute**
√Primary_NCS_Auto_Retry_Inh - X (inhibited)

3. COMMAND N1-1 TO DIAGNOSTIC

PCS2 Node 1: C&DH: MDM N1-1
SECONDARY NCS MDM Node 1
'Software Control'

sel MDM FDIR
√Second_NCS_Cmd_Xsitn_to_Dgnstc_Inh - <blank> (enable)

If X (inhibited)

'MDM Major State:'

sel Commands
cmd N1-1_MDM_Cmd_Xsitn_Dgnstc_State_Arm **Execute**

‘Software Control’

sel MDM FDIR
√Second_NCS_Cmd_Xsitn_to_Dgnstc_Inh - <blank> (enable)

‘MDM Major State:’

sel Commands
cmd N1-1_MDM_Xsitn_Dgnstc_State **Execute**

4. VERIFY N1-1 IS IN DIAGNOSTIC

PCS2 Node 1: C&DH: MDM N1-1
SECONDRY NCS MDM Node 1

√Frame Count - <static>

PCS2 Node 1: C&DH: MDM N1-2
PRIMARY NCS MDM Node 1

sel Transmit Mode Code

Primary_NCS_Transmit_Mode_Code

sel Primary NCS Xmt Mode Code Commands
cmd Xmt_Stat_Word_Tmplt
enter Bus ID - 2
enter RT Address - 6 **Execute**
√Subsystem Flag Set - X (set)

If Subsystem Flag Bit is set, N1-2 MDM is in Diagnostic State and is ready to accept diagnostic commands.

If transitioning N1-1 to Diagnostic, >>
If powering N1-1 off, go to step 5.

5. POWERING OFF N1-1 MDM

PCS1 Node 1: C&DH: MDM N1-1
SECONDARY NCS MDM Node 1
‘RPCM _N1RS1_A’

sel RPC 11 (Nod1_1_MDM)

RPCM _N1RS1_A_RPC_11 Detail

sel Commands
cmd Open **Execute**

√Position - Op

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C&T PROCEDURES

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C&T

ECLSS PROCEDURES

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FGB EGRESS #1

TOOLS REQUIRED:
Flashlight Hatch Tool
APAS Hatch Tool
Common Screwdriver

1. REPRESS STACK TO 14.7 PSIA

PCS
1. FGB: ECLSS
   FGB ECLSS

2. √FGB aft PEV - Close

L2
3. √O2/N2 CNTLR VLV SYS 1 - Op
   SYS 2 - AUTO

MO14W
4. 14.7 CABIN REG INLET SYS 1,2 VLV (two) → Op

2. DEACTIVATE NODE 1 - FGB VENTILATION

PCS
Node 1: ECLSS: Aft Port IMV Fan
Node 1 Aft Port IMV Fan
'Node 1 Aft Port IMV Fan'

1. **cmd** Off **Execute**

2. √Status - Off

3. PA/ICC HATCH BULKHEAD RING REMOVAL

PA/ICC Hatch
1. Rotate hatch handle in direction of open (Î ÒÊÐ) position.
   Unsecure bottom portion of protective ring alignment pin from socket on handle mechanism assembly.

2. Rotate protective ring up to Hatch and detach protective ring brackets from hatch hinge pin.

Pnl 402
3. Fold protective ring and secure to panel using two restraint straps.

4. ALARM CONTROL PANEL DEACTIVATION

1. POWER → Off
   √■ FUSE (light off)

PA Port & ICC Pnl 229
5. SECURE ÎÑÏ-4 FIRE EXTINGUISHERS IN PA AND ICC
1. Install blue launch restraints bolts (four) from clamps (two) with common screwdriver (bolts and clamps stowed earlier).

ICC Port Pnl 414 Ù Î-Ë Î
6. ICC LIGHTING DEACTIVATION
1. 1, 2, 3, 4 Ë1 (switch) → Off (switch down)

Pnl 430
Ù Î -Ë Î

2. 1,2,3,4 Ë1 (switch) → Off (switch down)

7. CONFIGURE FOR FGB EGRESS

Orbiter MO10W

1. 14.7 CAB REG INLET SYS 1, 2 vlv (two) → Cl

2. FGB : ECLSS

FGB : ECLSS

√FGB Dock Adptr PEV - Cl
Nod1 PEV → Cl

8. EGRESS FGB ICC

ICC

1. √All equipment bags and returning items removed from FGB ICC.

2. Close FGB PA/ICC Hatch
   Close Hatch.
   Rotate hatch handle in direction of CLOSE (ÇÀÊÐÛÒÜ) position.

9. CONFIGURE FOR PA/ICC HATCH LEAK CHECK

CRT

X: SM 60 TABLE MAINT

1. Record CABIN P: _____ psia (FGB ICC closeout press)
   Use paramid 0612405.
   __- 0.4__ psia (hatch delta = 20 mmHg)
2. Desired pressure = _____ psia

3. Record time and FGB ICC pressure:

FGB : ECLSS

MET: _____/____:____:____
FGB Cab Press: _____ mmHg

10. FIRST PARTIAL DEPRESS

Orbiter AW82B

1. AIRLK DEPRESS vlv cap - Vent, Remove

NOTE
Expect Klaxon each time airlock depress valve is opened.

2. AIRLK DEPRESS vlv → 5

FGB : ECLSS

3. √FGB Cab Press not decreasing.

Orbiter AW82B

4. When CABIN P = desired pressure from step 9.2 (est. ~3 minutes)
   AIRLK DEPRESS vlv → Cl

PA Port Ù Î -Ë Î

11. PA AND ICC LIGHTING DEACTIVATION

1. 1,2,3,4 Ë1 (switch) → Off (switch down)

12. EGRESS FGB PA

PA

1. √All equipment bags and returning items removed from FGB PA.

2. Clean PMA1-PA Hatch bulkhead seal with alcohol pads.

13. CLOSE FGB FW HATCH:

1. Select 'ÐÀÁ Î ×ÅÅ' (WORKING) torque setting on hatch tool.

2. Insert tool in hatch socket.

3. Rotate 6-7 turns in direction of 'ÇÀÊÐ' (CLOSE) arrow until it clicks.

NOTE
If tool prematurely slips or does not engage Select 'ÀÂÀÐÅÉ Í Î Å' (EMERGENCY) setting on hatch tool. Reattempt to close Hatch.

14. CONFIGURE FOR FGB FW HATCH LEAK CHECK

X: SM 60 TABLE MAINT

1. Record CABIN P: _____ psia (FGB PA closeout press)
   Use paramid 0612405.
   - 0.4 psia (hatch delta = 20 mmHg)
2. Desired pressure = _____ psia

3. Record time and FGB PA pressure:

FGB : ECLSS

MET: _____/____:____:____
Docking Adapter Cab Press: _____ mmHg

15. SECOND PARTIAL DEPRESS

Orbiter AW82B

1. Start depress
   AIRLK DEPRESS vlv → 5

FGB: ECLSS

2. √Docking Adapter Cab Press not decreasing

Orbiter AW82B

3. Stop depress when CABIN P = desired pressure from step 14.2 (est. ~3.5 minutes)
   AIRLK DEPRESS vlv → Cl
   Install AIRLK DEPRESS vlv cap

16. FGB FWD HATCH LEAK CHECK

FGB : ECLSS

1. At MET 30 min past previous MET recorded in step 19, proceed
   Record Docking Adapter Cab Press: _____ mmHg
   Record FGB Cab Press: _____ mmHg
   MET: ____/___:___:___

NOTE
If FGB Cab Press or Docking Adapter Cab Press ≤ (pressures recorded in step 12.3 and 16.3 - TBD mmHg). Notify **MCC-H**

2. Report results of leak check to **MCC-H**.

FGB EGRESS #2

TOOLS REQUIRED:
Flashlight Hatch Tool
APAS Hatch Tool
Common Screwdriver

1. REPRESS STACK TO 14.7 PSIA

PCS
1. FGB: ECLSS
   FGB ECLSS

2. √FGB aft PEV - Close

L2
3. √O2/N2 CNTLR VLV SYS 1 - Op
   SYS 2 - AUTO

MO14W
4. 14.7 CABIN REG INLET SYS 1,2 VLV (two) → Op

2. PA/ICC HATCH BULKHEAD RING REMOVAL

PA/ICC Hatch
1. Rotate hatch handle in direction of open (Î ÒÊÛÒ Î) position.
   Unsecure bottom portion of protective ring alignment pin from socket on handle mechanism assembly.

2. Rotate protective ring up to Hatch and detach protective ring brackets from hatch hinge pin.

Pnl 402
3. Fold protective ring and secure to panel using two restraint straps.

3. ALARM CONTROL PANEL DEACTIVATION
1. POWER → Off
   √■ FUSE (light off)

PA Port & ICC Pnl 229
4. SECURE Î ÑÏ -4 FIRE EXTINGUISHERS IN PA AND ICC
1. Install blue launch restraints bolts (four) from clamps (two) with common screwdriver (bolts and clamps stowed earlier).

ICC Port Pnl 414 Ù Î -Ë Î
5. ICC LIGHTING DEACTIVATION
1. 1, 2, 3, 4 Ë1 (switch) → Off (switch down)

Pnl 430 Ù Î -Ë Î
2. 1,2,3,4 Ë1 (switch) → Off (switch down)

6. CONFIGURE FOR FGB EGRESS

Orbiter MO10W
1. 14.7 CAB REG INLET SYS 1, 2 vlv (two) → Cl

2. FGB: ECLSS
   FGB: ECLSS

√FGB Dock Adptr PEV - Cl
Nod1 PEV → Cl

7. EGRESS FGB ICC

ICC 1. √All equipment bags and returning items removed from FGB ICC.

2. Close FGB PA/ICC Hatch
   Close Hatch.
   Rotate hatch handle in direction of CLOSE (ÇÀÊÐÛÒÜ) position.

8. CONFIGURE FOR PA/ICC HATCH LEAK CHECK

CRT X: SM 60 TABLE MAINT

1. Record CABIN P: _____ psia (FGB ICC closeout press)
   Use paramid 0612405.
   - 0.4 psia (hatch delta = 20 mmHg)
2. Desired pressure = _____ psia

3. Record time and FGB ICC pressure:

   FGB: ECLSS

   MET: _____/____:____:____
   FGB Cab Press: _____ mmHg

9. FIRST PARTIAL DEPRESS

Orbiter AW82B 1. AIRLK DEPRESS vlv cap - Vent, Remove

NOTE
Expect Klaxon each time airlock depress valve is opened.

2. AIRLK DEPRESS vlv → 5

   FGB: ECLSS

3. √FGB Cab Press not decreasing.

Orbiter AW82B 4. When CABIN P = desired pressure from step 8.2 (est. ~3 minutes)
   AIRLK DEPRESS vlv → Cl

PA Port Ù Î -Ë Î 10. PA AND ICC LIGHTING DEACTIVATION

1. 1,2,3,4 Ë1 (switch) → Off (switch down)

11. EGRESS FGB PA

PA 1. √All equipment bags and returning items removed from FGB PA.

2. Clean PMA1-PA Hatch bulkhead seal with alcohol pads.

12. CLOSE FGB FW HATCH:

1. Select 'ÐÀÁ Î ×ÅÅ' (WORKING) torque setting on hatch tool.

2. Insert tool in hatch socket.

3. Rotate 6-7 turns in direction of 'ÇÀÊÐ' (CLOSE) arrow until it clicks.

NOTE
If tool prematurely slips or does not engage Select 'ÀÂÀÐÉÉ Í Î Å' (EMERGENCY) setting on hatch tool. Reattempt to close Hatch.

13. CONFIGURE FOR FGB FW HATCH LEAK CHECK

X: SM 60 TABLE MAINT

1. Record CABIN P: _____ psia (FGB PA closeout press)
   Use paramid 0612405.
   - 0.4 psia (hatch delta = 20 mmHg)
2. Desired pressure = _____ psia

3. Record time and FGB PA pressure

FGB: ECLSS

MET: _____/____:____:____
Docking Adapter Cab Press: _____ mmHg

14. SECOND PARTIAL DEPRESS

Orbiter AW82B
1. Start depress
   AIRLK DEPRESS vlv → 5

FGB: ECLSS

2. √Docking Adapter Cab Press not decreasing

Orbiter AW82B
3. Stop depress when CABIN P = desired pressure from step 13.2
   (est. ~3.5 minutes)
   AIRLK DEPRESS vlv → Cl
   Install AIRLK DEPRESS vlv cap

15. FGB FWD HATCH LEAK CHECK

FGB: ECLSS

1. At MET 30 min past previous MET recorded in step 19, proceed
   Record Docking Adapter Cab Press: _____ mmHg
   Record FGB Cab Press: _____ mmHg
   MET: ____/___:___:___

NOTE
If FGB Cab Press or Docking Adapter Cab Press ≤ (pressures recorded in step 12.3 and 16.3 - TBD mmHg). Notify **MCC-H**.

2. Report results of leak check to **MCC-H**.

FGB INGRESS

TOOLS AND EQUIPMENT REQUIRED:
Spotlight
General Purpose Tape (2")
4-inch Adjustable Wrench
APAS Hatch Tool
Alcohol Pads (for APAS hatch seal)
'Return to Houston' Bag

WARNING

The FGB aft PEV must be open prior to equalizing the FGB with the stack due to Hatch negative pressure constraint.

EQUALIZE FGB WITH ORBITER STACK

PCS — FGB: ECLSS
FGB ECLSS

1. √FGB aft PEV - Open

2. √FGB ICC/PA PEV - Open

3. When FGB Fwd PEV - Open, proceed

CRT — SPEC 66 ENVIRONMENT

4. When CABIN dP/dT < 0.01, (~8 minutes), proceed

5. INGRESS PA

FGB APAS Hatch — Per **MCC-H**, open FGB PA APAS Hatch

1. Select 'ÐÀÁ Î ×ÅÅ' (WORKING) torque setting on hatch tool.
2. Insert tool in hatch socket.
3. Rotate 6-7 turns in direction of '**XXXX**' (Open) arrow until it clicks.

```
**************************************************************
*  If tool prematurely slips or does not engage              *
*       Select 'ÀÂÀÐÅÉÉ Í Î Å' (EMERGENCY) setting  *
*         on hatch tool.                                     *
*       Reattempt to open Hatch.                             *
**************************************************************
```

4. Verify all latches are opened.
5. Remove tool.
6. Open Hatch.

7. Secure Hatch in open position using fixing device.

8. Inform **MCC-H** of PA Hatch opening complete.

PA Port 6. PA AND ICC LIGHTING ACTIVATION

Pnl Ù Î -Ë Î

1. 1-Ë (switch) → On (switch up)

2. √■ Ä1,2,3,4 (four LEDs off)

NOTE
Light switch 5-Ë1 is non-functional.

PA Port 7. READY Î Ñ Ï -4 FIRE EXTINGUISHER IN PA

1. Remove blue launch restraints bolts (four) from clamps (two) with common screwdriver.
   Tmpry stow clamps and bolts.

PA Ovhd 8. È Ï Ê-1 GAS MASK READINESS

1. Remove lock wire from cap and dispose in Trash Bag.

PA 9. INGRESS ICC

1. Per **MCC-H GO**, open FGB PA-ICC Hatch
   Rotate hatch handle in direction of OPEN (Î ÒÊÐÛÒ Î) position.
   Open Hatch until hatch clicks and stops.

2. Inform **MCC-H** PA-ICC Hatch is opened.

TAKE AIR SAMPLES OF FGB

10. Collect air samples (two) from inside FGB using Air Sample Bottles.

ICC Port 11. ICC LIGHTING ACTIVATION

Pnl 414
Ù Î -Ë Î

1. 1-Ë1 (switch) → On (switch up)
   √■ Ä1,2,3,4 (four LEDs off)

Pnl 430
Ù Î -Ë Î

2. 1-Ë1 (switch) → On (switch up)
   √■ Ä1,2,3,4 (four LEDs off)

NOTE
Light switch 5-Ë1 is non-functional on Pnls 430 and 414.

12. PA-ICC HATCH BULKHEAD RING INSTALLATION

Pnl 402

1. Remove protective ring by unsecuring two restraint clips from launch restraint brackets using TBD wrench and unloosen two restraint straps.

NOTE

If time available, remove four (4) launch restraint bolts from the two launch restraint bracket with common screwdriver. Dispose blue launch restraints bolts and brackets in Trash Bag.

PA-ICC Hatch

2. Unfold protective ring and connect protective ring brackets on hatch hinge pin.
   Verify bracket mechanisms locked to hinge pin.

3. Secure bottom portion of protective ring alignment pin on socket of handle mechanism assembly.
   Rotate hatch handle in direction of close (ÇÀÊÐÛÒÎ) position.

13. ALARM CONTROL PANEL ACTIVATION

ICC Pnl TBD

1. POWER → On
   - √□ FUSE (light on)
   - √■ F1 (LED off)
   - √TTS/LOCAL - LOCAL

2. TEST (pb) - push and hold
   - √▚ CI (blinking)
   - √□ All other lights and LEDs on
   - √□ Siren activated.

3. TEST (pb) - release
   - √□ FUSE (light on)
   - √■ F1 (LED off)
   - √■ All other lights and LEDs off
   - √Siren off

14. INSTALL AIR DUCTING

PA

1. Deploy duct rotator device.

ICC Pnl 102

2. Remove launch restraint tape from flexible duct (77KM-7660-300) and unfold.

PA

3. Secure free end of flexible air duct (77KM-7660-300) using Velcro on end of duct rotator device.

ICC Behind Pnl 202

4. Open TBD container (77KM-7660-280), retrieve flexible duct (77KM-7660-340).

PA

5. Using strap, connect flexible duct (77KM-7660-340) to flange of the TV1(ÖÂ1) fan.

Pnl 202

6. Unstow flexible air duct (77KC-7664-70-01).

PA 7. Connect flexible air duct (77KC-7664-70-01) and connect with flexible air duct (77KM-7660-340).

Pnl 202 8. Unstow flexible air duct (77KC-7664-70-02).

PA 9. Connect flexible air duct (77KC-7664-70-02) and connect with flexible air duct (77KC-7660-70-01).

ICC Pnl 204 10. Remove FGB rigid air duct (77KM-7660-170) by unsecuring two restraint clamps using TBD tool.
Tmpry stow bolts.

ICC Pnl 204 11. Remove Node 1 rigid air duct (77KM-7660-170) by unsecuring two restraint clamps using TBD tool.
Tmpry stow bolts.

PMA1-PA Hatch 12. Connect FGB rigid air duct and Node 1 rigid air duct.

PA 13. Connect free end of flexible air duct (17KC-7664-70-02) to FGB rigid air duct.

ICC Behind Pnl 202 14. Retrieve flexible air duct (77KM-7660-330).

PMA1 15. Connect free end of flexible air duct (17KM-7660-330) to Node 1 rigid air duct.

16. Detach cap to PMA 1 hard duct inlet.
Stow cap.

17. Connect free end of flexible air ( ) to PMA 1 duct inlet and secure with flat band coupling.

Pnl 229 15. READY Î Ñ Ï -4 FIRE EXTINGUISHER IN ICC

1. Remove blue launch restraints bolts (four) from clamps (two) with common screwdriver.
Tmpry stow clamps and bolts.

Pnl 230 16. È Ï Ê-1 GAS MASK READINESS IN ICC

1. Remove lock wire from cap and dispose in Trash Bag.

Pnl 230 17. ACTIVATE NODE 1 - FGB INTERMODULE VENTILATION
PCS Node 1: ECLSS
NODE 1: ECLSS

sel Node_1_Aft_Port_IMV_Fan

1. **cmd** RPC Position - Close **Execute**

2. √RPC Position - Close

NODE 1: Aft Port IMV Fan

3. **cmd** On **Execute**

4. √Status - In Transition

NODE 1: Aft Port IMV Fan

5. Wait 15 seconds.

6. √Status - On

7. √Speed, rpm: 7462 --- 9500

18. REPRESS STACK TO 14.3 PSIA

WARNING

Do not pressurize Orbiter stack to above the SM pressure due to Hatch negative pressure constraint.

PCS FGB: ECLSS

FGB ECLSS

1. √FGB aft PEV - Open

L2 2. √O2/N2 CNTLR VLV SYS 1 - Op
SYS 2 - AUTO

MO14W 3. 14.7 CABIN REG INLET SYS 1,2 VLV (two) - Op

SPEC 66 ENVIRONMENT

4. When CABIN PRESS = 14.3

MO14W 14.7 CABIN REG INLET SYS 1,2 VLV (two) - Cl

FGB INGRESS #2

TOOLS AND EQUIPMENT REQUIRED:
Flashlight
Duct Tape
4” Adjustable Wrench
Common Screwdriver
APAS Hatch Tool
Alcohol Pads (for APAS hatch seal)
Trash Bag

NOTE
Procedure starts with **MCC-M** command to open the FGB fwd PEV.

CRT SPEC 66 ENVIRONMENT

1. When CABIN dP/dT < 0.01 (approx. ~15 minutes)

2. INGRESS PA

FGB Fwd Hatch

Per **MCC-H**, open FGB Fwd Hatch

1. Select ‘ÐÀÁ Î ×ÅÅ’ (WORKING) torque setting on hatch tool.
2. Insert tool in hatch socket.
3. Rotate 6-7 turns in direction of ‘**XXX**’ (Open) arrow until it clicks.

NOTE
If tool prematurely slips or does not engage. Select ‘ÀÂÀÐÅÉÉ Í Î Å’ (EMERGENCY) setting on hatch tool. Reattempt to open Hatch.

4. Verify all latches are opened.
5. Remove tool.
6. Open Hatch.
7. Secure Hatch in open position using fixing device.
8. Inform **MCC-H** of FGB Fwd Hatch opening complete.

PA Port Pnl Ù Î -Ë Î

3. PA AND ICC LIGHTING ACTIVATION
   1. 1-Ë1 (switch) → On (switch up)
   2. √■ Ä1, 2, 3, 4 (four LEDs off)

NOTE
Light switch 5-Ë1 is non-functional.

PA Port 4. READY ÎÑÏ-4 FIRE EXTINGUISHER IN PA

1. Remove blue launch restraints bolts (four) from clamps (two) with common screwdriver.
   Tmpry stow clamps and bolts.

PA 5. INGRESS ICC

1. Per **MCC-H GO**, open FGB PA/ICC Hatch
   Rotate hatch handle in direction of OPEN (**XXXX**) position.
   Open Hatch until Hatch clicks and stops.

2. Inform **MCC-H** PA/ICC Hatch is opened.

ICC Port 6. ICC LIGHTING ACTIVATION

Pnl 414 ÙÎ-ËÎ
1. 1-Ë1 (switch) → On (switch up)
   √■ Ä1, 2, 3, 4 (four LEDs off)

Pnl 430 ÙÎ-ËÎ
2. 1-Ë1 (switch) → On (switch up)
   √■ Ä1, 2, 3, 4 (four LEDs off)

NOTE
Light switch 5-Ë1 is non-functional on Pnls 430 and 414.

7. PA/ICC HATCH BULKHEAD RING INSTALLATION

Pnl 402
1. Remove protective ring by unsecuring two restraint clips from launch restraint brackets using TBD wrench and unloosen two restraint straps.

NOTE
If was not done at 2A ingress, remove four launch restraint bolts from the two launch restraint bracket with common screwdriver. Dispose blue launch restraints bolts and brackets in Trash Bag.

PA/ICC Hatch
2. Unfold protective ring and connect protective ring brackets on hatch hinge pin. Verify bracket mechanisms locked to hinge pin.

3. Secure bottom portion of protective ring alignment pin on socket of handle mechanism assembly. Rotate hatch handle in direction of Close (**XXXX**) position.

8. ALARM CONTROL PANEL ACTIVATION

ICC Pnl TBD
1. POWER → On
   √□ FUSE (light on)
   √■ F1 (LED off)
   √TTS/LOCAL - LOCAL

2. TEST (pb) - push and hold
   √▚ CI (blinking)
   √☐ All other lights and LEDs on
   √☐ Siren activated

3. TEST (pb) - release
   √☐ FUSE (light on)
   √■ F1 (LED off)
   √■ All other lights and LEDs off
   √Siren off

Pnl 229 9. READY Î Ñ Ï -4 FIRE EXTINGUISHER IN ICC
Remove blue launch restraints bolts (four) from clamps (two) with common screwdriver.
Tmpry stow clamps and bolts.

NODE 1 DOCKING/UNDOCKING LEAK CHECK

CALCULATE NODE 1 PRESSURE CHANGE RATE PRE ORBITER DOCKING

PCS Node 1: ECLSS

NODE 1 ECLSS

1. Approximately 30 minutes pre Orbiter docking
   Record Node 1 Pressure (P1)
   Cab_Press: P1 = _____ mmHg

2. Record MET1: ____/____:____:____

3. Wait until Orbiter docking complete.
   Record Node 1 Pressure (P2)
   Cab_Press: P2 = _____ mmHg

4. Record MET2: ____/____:____:____

5. ΔP1 = P1 - P2 = _____ mmHg

6. ΔMET1 = MET2 - MET1 = _____ min

7. Node Press Change Rate 1 = ΔP1/ΔMET1 = _____ mmHg/min

CALCULATE NODE 1 PRESSURE CHANGE RATE POST ORBITER DOCKING

8. Approximately 30 minutes post Orbiter docking
   Record Node 1 Pressure (P3)
   Cab_Press: P3 = _____ mmHg

9. Record MET3: ____/____:____:____

10. Wait until Orbiter docking complete.
    Record Node 1 Pressure (P4)
    Cab_Press: P4 = _____ mmHg

11. Record MET4: ____/____:____:____

12. ΔP2 = P3 - P4 = _____ mmHg

13. ΔMET2 = MET4 - MET3 = _____ min

14. Node Press Change Rate 2 = ΔP2/ΔMET2 = _____ mmHg/min

ASSESS CHANGE IN NODE 1 PRESSURE CHANGE RATE

15. If Node Press Change Rate 2 > Node Press Change Rate 1 ± TBD
    Execute NODE PRESS HI/LOW procedure.

PRE-INGRESS ATMOSPHERE SAMPLING

TOOLS AND EQUIPMENT REQUIRED

Unstow:

External Sampling Adapter (ESA)
Evacuated Sample Container

ATTACH ESA TO MPEV

1. √MPEV handle - Close

2. √ESA handle - Close

3. Align arrow on ESA handle with arrow on MPEV handle.

4. Align ESA screws (four) with holes on hatch panel surrounding MPEV.

NOTE
There is a dot on ESA that will align with a piece of silver tape on the hatch panel.

5. Manually tighten ESA screws (4).

PURGE VOLUME BETWEEN ESA AND MPEV

6. √ESA Sample Valve - Close

7. ESA handle → Open

8. ESA Sample Valve → Open

9. Wait 10 seconds.

10. ESA Sample Valve → Close

ATTACH EVACUATED SAMPLE CONTAINER TO ESA

11. Record date and time on sample container.

12. Unscrew dustcap on evacuated sampling bottle.

13. Connect evacuated sample container to ESA Sample Valve (procedure TBD).

SAMPLE MODULE ATMOSPHERE

14. ESA Sample Valve → Open

15. Evacuated Sample Container Valve → Open

16. Wait 10 seconds.

17. Evacuated Sample Container Valve → Close

18. ESA Sample Valve → Close

19. ESA handle → Close

DETACH SAMPLE CONTAINER FROM ESA

20. Disconnect Sample Container from ESA (procedure TBD).

21. Stow Sample Container in TBD location.

DETACH ESA FROM MPEV

22. √ESA handle - Close

23. ESA Sample Valve → Open

24. Wait TBD seconds.

25. ESA Sample Valve → Close

26. Untighten ESA screws (4).

27. Remove ESA from MPEV face.

28. Clean interior volume of ESA to remove contaminants that may adhere to interior lining. (Process TBD).

29. Stow ESA in TBD shuttle middeck locker.

NODE 1 CABIN FAN DEACTIVATION R2

1. DEACTIVATE NODE 1 CABIN FAN

EPCS

Node 1: ECLSS: cab fan

Node 1 Cabin Fan

cmd Off **Execute**

√Req Ind - Requested

cmd Off Confirm **Execute**

√State - Off

√Limit Status - Inh

√Speed, rpm - Decreasing

sel RPCM N14B B RPC 17

RPCM N14B B RPC 17

√Open Cmd - Ena

√**MCC-H**

cmd Open **Execute**

√Position - Op

2. SMOKE DETECTOR 1,2 DEACTIVATION

Node 1: ECLSS: SD1

Node 1 Smoke Detector 1

cmd Monitor Status - Inhibit **Execute**

√Monitor Status - Not Mon

sel RPCM N14B C RPC 03

RPCM N14B C RPC 03

√Open Cmd - Ena

√**MCC-H**

cmd Open **Execute**

√Position - Op

Node 1: ECLSS: SD2

Node 1 Smoke Detector 2

cmd Monitor Status - Inhibit **Execute**

√Monitor Status - Not Mon

sel RPCM N13B A RPC 16

RPCM N13B A RPC 16

√Open Cmd - Ena

√**MCC-H**

cmd Open **Execute**
√Position - Op

Z1 PRESSURE DOME EGRESS

TOOLS AND EQUIPMENT REQUIRED
Internal Sampling Adapter (ISA)
Pressure Module (PM)
Fluke 87 Multimeter
Vacuum Access Jumpers, VAJ (two) - 5 ft., 35 ft.
Torque wrench

Z1 PRESSURE DOME EGRESS

Node 1 Ovhd
1. Close Node 1 Overhead Hatch per decal.

2. √MPEV - Close

PRESSURE MODULE/ISA/VAJ/MPEV/PPRV SETUP

3. ISA Sample Port → Close

Node 1 Port
4. √PPRV Snout Isolation Valve - Close

5. Torque 35 ft VAJ to Port PPRV snout to 750-825 in-lbf.

6. Torque other end of 35 ft VAJ to ISA-VAJ port #2 to 750-825 in-lbf.

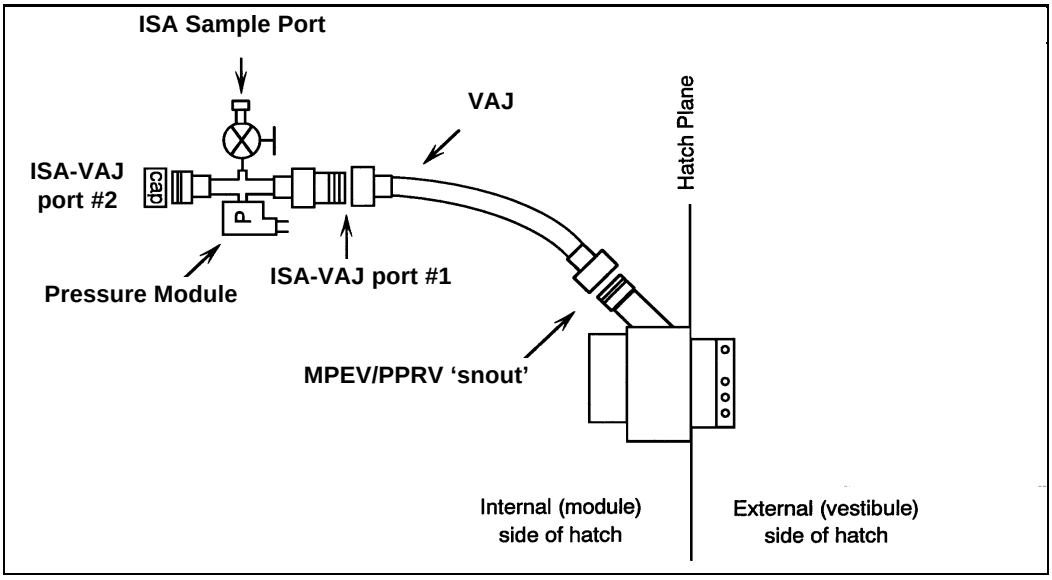

Figure 1.- Title.

MULTIMETER/PRESSURE MODULE SETUP

Node 1 Ovhd
7. √Pressure Module - Off

8. √Multimeter - Off

9. Pressure Module → mmHgA

10. Depress yellow button for 2 seconds while selecting V.

Z1 PRESSURE DOME DEPRESS

WARNING
1. Opening the PPRV/MPEV will start the depress.
2. The VAJ may whip if untethered.
3. The PPRV/MPEV should be opened slowly.

Node 1 Port
11. PPRV Snout Isolation Valve → Open

Node 1 Ovhd
12. MPEV → Open

13. When multimeter reading < 0.001 V (~2 minutes)
Node 1 Port
PPRV Snout Isolation Valve → Close

14. √Multimeter reading not ↑

NODE 1 OVERHEAD HATCH FINE LEAK CHECK

Node 1 Ovhd
15. Record multimeter reading: P_1 = _____ V

16. MPEV → Close

17. Wait 30 minutes.
Node 1 Port
PPRV Snout Isolation Valve → Open

18. Wait 30 seconds.
PPRV Snout Isolation Valve → Close

19. MPEV → Open

20. Record multimeter reading: P_2 = _____ V
dP = P_2 - P_1 = _____ V
If dP > 0.0002 V, hatch leak check failed, >>

√**MCC-H**

DISMANTLE AND STOW EQUIPMENT

Node 1 Ovhd
21. MPEV → Close

22. Multimeter → Off

23. Pressure Module → Off

24. Disconnect and stow Multimeter.

25. Disconnect VAJs and stow in TBD location.

26. Cap ISA and stow in TBD location.

CAP MPEV AND PPRV

Node 1 Port — 27. Hand tighten PPRV cap.

Node 1 Ovhd — 28. Hand tighten MPEV cap.

Z1 PRESSURE DOME INGRESS

TOOLS AND EQUIPMENT REQUIRED
Internal Sampling Adapter (ISA)
Pressure Module (PM)
Fluid Fitting Torque Device (FFTD)
Fluke 87 Multimeter
Vacuum Access Jumper (VAJ) - 5 ft.
Stop Watch

Z1 PRESSURE DOME PRESSURIZATION AND GROSS LEAK CHECK

SPEC 66 ENVIRONMENT

AFD 1. Record CABIN dP/dT; R_1 = _____

Node 1 Ovhd 2. Uncap MPEV.

WARNING

Opening the overhead MPEV will start the pressurization. The MPEV should be opened slowly.

3. MPEV → Open

4. Wait 30 seconds.

SPEC 66 ENVIRONMENT

AFD Record CABIN dP/dT; R_2 = _____
dR = R_2 - R_1 = _____
If dR > 0.02, pressure dome gross leak check failed, >>

√**MCC-H**

Node 1 Ovhd 5. MPEV → Close

6. Start Stop Watch.

PRESSURE MODULE/ISA/VAJ/MPEV SETUP
7. √ISA-VAJ port #2 - Capped

8. √ISA Sample Port - Close

9. Torque VAJ to MPEV to 750-825 in-lbf.

10. Torque other end of VAJ to ISA-VAJ port #1 to 750-825 in-lbf.

11. √Pressure Module plugged into ISA.

12. MPEV → Open

MULTIMETER/PRESSURE MODULE SETUP

Node 1 Ovhd 13. √Pressure Module - Off

14. √Multimeter - Off

15. Plug Pressure Module into Multimeter (COM to COM, V to VΩ→|-).

16. Pressure Module → mmHgA

17. Depress yellow button for 2 seconds while selecting V.

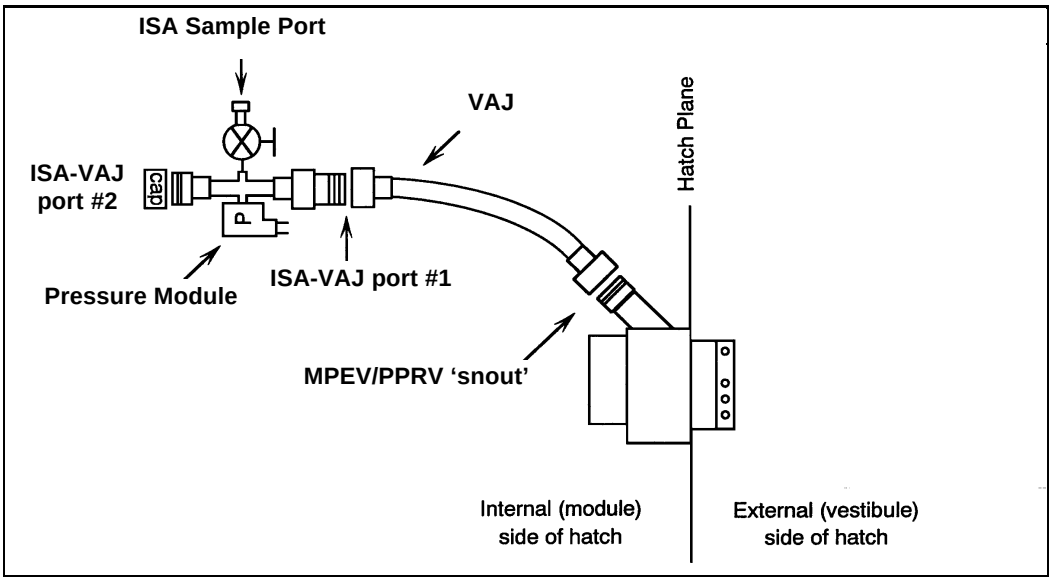

Figure 1.- Module Setup.

Z1 PRESSURE DOME FINE LEAK CHECK

18. When Stop Watch reads 10 minutes:
    Record pressure. P = _____ V
    If P is < 0.58 V, leak check failed, >>

√**MCC-H**

NOTE
A reading of less than 0.58 V (i.e. 580/11.2 mmHg/psi absolute) ten minutes after pressurization at 12.7 psi corresponds to a leak requiring a feed of greater than 1 lb/hour.

Z1 PRESSURE DOME INGRESS

Node 1 Ovhd 19. Multimeter → Off

20. ISA Pressure Module → Off

21. ISA Sample Port → Open

22. Open Node 1 overhead hatch per decal.

23. MPEV $\rightarrow$ Close

NODE 1 EGRESS

TOOLS AND EQUIPMENT REQUIRED
TBD

DEPRESS STACK

Orbiter AW82B
1. AIRLK DEPRESS vlv cap → Vent, remove

2. AIRLK DEPRESS vlv → 5

3. When CABIN P = 13.6 (est. ~3 minutes)
   AIRLK DEPRESS vlv → Cl

ENABLE PPRVs

Node 1 Port Stbd Hatch
4. Remove PPRV caps (two).

NOD1 xx_xx
5. Stow caps in rack (TBD).

CONFIGURE FOR NODE 1 EGRESS

Node 1 Locker
6. Remove station portable fire extinguisher from Node 1 forward port alcove.
   Remove shuttle QDMs (two) from TBD location.
   Stow in Bag.

7. √All equipment bags and returning items removed from Node 1.

DESICCANT INSTALLATION AND PORTABLE FAN ACTIVATION

8. Fan Power (four) → High
   √Fan RPM control position (four) - Full CW
   √Fan is running

MODULE EGRESS

Node 1 Fwd Hatch
9. √MPEV - uncapped

PMA 2
10. Open grille cover on PMA 2 hard duct.

> NOTE
> In the following step, all Node 1 lights will go off during Node 1 Initial Egress.

Node 1 Fwd
11. Perform NODE 1 CABIN FAN DEACTIVATION, all (SODF: ECLSS), then:
    Node 1 Fwd Stbd IMV Valve → Close

Node 1 Aft Endcone
NOD1 General Lighting pb - Off
NOD1 General Lighting pb - On

Node 1 Fwd Hatch

12. Close Node 1 Forward Hatch per decal.

13. √MPEV - Close

NOTE
The following steps (Remove Power from N1 Lights) will only be performed for Node 1 Initial Egress.

REMOVE POWER FROM N1 LIGHTS

PCS

14. Node 1: EPS: RPCM N13B A

RPCM N13B A

sel RPCM Details

sel RPC [X] [X] = 5 13

cmd Open **Execute**

√Position - Op

Repeat

Node 1: EPS: RPCM N13B B

RPCM N13B B

sel RPC 1

sel Commands

cmd Open **Execute**

√Position - Op

Node 1: EPS: RPCM N13B C

RPCM N13B C

sel RPC 1

sel Commands

cmd Open **Execute**

√Position - Op

Node 1: EPS: RPCM N14B B

RPCM N14B B

sel RPC 1

sel Commands

cmd Open **Execute**

√Position - Op

Node 1: EPS: RPCM N14B C

RPCM N14B C

sel RPCM Details
sel RPC [X] [X] = 2 15 16

cmd Open **Execute**
√Position - Op

Repeat

AIR DUCT REMOVAL/CONFIGURATION

PMA 2 Aft

15. Disconnect PMA/Node extension duct from starboard IMV flange. Tmpry stow V-band clamp.

16. With combination ratchet and socket, install IMV cap to port IMV flange. Tighten V-band clamps to 34 to 36 in-lbf (3.8 to 4.1 N-m).

NODE 1 EGRESS #2

TOOLS AND EQUIPMENT REQUIRED
TBD

DEPRESS STACK

Orbiter AW82B
1. AIRLK DEPRESS vlv cap → Vent, remove
2. AIRLK DEPRESS vlv → 5

3. When CABIN P = 13.6 (est. ~3 minutes):
   AIRLK DEPRESS vlv - Cl

ENABLE PPRVS

Node 1 Port, Stbd Hatch
4. Remove PPRV caps (two).

NOD1 xx_xx
5. Stow caps in rack (TBD).

CONFIGURE FOR NODE 1 EGRESS

Node 1 Locker
6. Remove station portable fire extinguisher from Node 1 forward port alcove.
   Remove shuttle QDMs (two) from TBD location.
   Stow in bag.

7. √All equipment bags and returning items removed from Node 1.

DESICCANT INSTALLATION AND PORTABLE FAN ACTIVATION

8. Replace sixteen batteries in four fans.
   Install desiccant bags (four)
   Fan Power (four) → High
   √Fan RPM control position (four) - Full CW
   √Fan is running

MODULE EGRESS

Node 1 Fwd Hatch
9. √MPEV - uncapped

PMA 2
10. Open grille cover on PMA 2 hard duct.

Node 1 Fwd
11. Node 1 Fwd Port IMV Valve → Close

Node 1 Fwd Hatch
12. Close Node 1 Forward Hatch per decal.

13. √MPEV - Close

AIR DUCT REMOVAL/CONFIGURATION

PMA 2 Aft

14. Disconnect PMA/Node extension duct from starboard IMV flange. Tmpry stow V-band clamp.

15. With combination ratchet and socket, install IMV cap to port IMV flange. Tighten V-band clamps 34 to 36 in-lbf (3.8 to 4.1 N-m).

NODE 1 IMV FWD STBD IMV VLV OPENING

PCS Node 1: ECLSS: FDIR

Node 1 FDIR Details

1. **cmd** Node 1-1 MDM IMV FDIR Status - Enable **Execute**
   cmd Node 1-2 MDM IMV FDIR Status - Enable **Execute**
   √N1_1 MDM IMV FDIR Stat - Ena
   √N1_2 MDM IMV FDIR Stat - Ena

   NODE 1: ECLSS: IMV Fwd Stbd Vlv

   Node 1 IMV Fwd Stbd Vlv

   'RPCM N13B C RPC 13'

2. sel RPCM N13B C RPC 13
   RPCM N13B C RPC 13

   √**MCC-H**

   cmd Close **Execute**
   √Position - Cl

   'Node 1 IMV Fwd Stbd Vlv'

3. **cmd** On **Execute**
   √Enable - On
   cmd Open **Execute**
   √Open Indicator - Enabled
   cmd Open Confirm **Execute**
   Wait 20 seconds.
   √Status - Op

EQUALIZE WITH NODE 1

PMA 2 Aft

4. Node Fwd Hatch MPEV → Open
5. Wait TBD minutes.
6. Open Node 1 Forward Hatch per decal.
7. Node Fwd Hatch MPEV → Close

DUCTING CONFIGURATION

8. Remove V-band assembly and IMV cap from Node IMV Fwd Stbd duct flange.

NOTE
Node starboard is on the shuttle port side.

9. Tmpry stow V-band, cap in TBD location.

10. Loosen V-band assembly restraining PMA 2 air duct jumper to support.

11. Connect PMA 2 air duct jumper to PMA-Node IMV duct extension.

12. Install duct assembly around perimeter of PMA deck and secure with support straps.

13. Connect end of PMA-Node duct extension to Node IMV Fwd Stbd duct flange with V-band clamp, tighten until secure.

ESTABLISH VENTILATION WITH NODE 1

Node 1: ECLSS: cabin fan

Node 1 Cabin Fan

EPCS
PMA 2

14. If state - Off

Perform NODE 1 CABIN FAN ACTIVATION R2, all (SODF: ECLSS), then:

15. Close grille cover on PMA 2 hard duct.

16. √Airflow from Node through open hatchway

PROVIDE POWER TO NODE 1 INTERNAL LIGHTS

EPCS

17. Node 1: EPS: RPCM N13B A

RPCM N13B A

sel RPCM Details

sel RPC [X] [X] = 5 13

√**MCC-H**

√RPC [X] Close Cmd - Ena

cmd Close **Execute**

√RPC [X] Position - Cl

Repeat

18. Node 1: EPS: RPCM N13B B

RPCM N13B B

sel RPC 1

√Close Cmd - Ena

√**MCC-H**

sel Commands

cmd Close **Execute**

√Position - Cl

19. Node 1: EPS: RPCM N13B C
RPCM N13B C

sel RPC 1
√Close Cmd - Ena

√**MCC-H**

sel Commands
cmd Close **Execute**
√Position - Cl

20. Node 1: EPS: RPCM N14B B
RPCM N14B B

sel RPC 1
√Close Cmd - Ena

√**MCC-H**

sel Commands
cmd Close **Execute**
√Position - Cl

21. Node 1: EPS: RPCM N14B C
RPCM N14B C

sel RPCM Details
sel RPC [X] [X] = 2 | 15 | 16

√**MCC-H**

√RPC [X] Close Cmd - Ena
cmd Close **Execute**
√RPC [X] Position - Cl

Repeat

NOTE
It may take 30 minutes for cold lights to come up to full bright. Lights must come up to full bright before turning them off.

PFE AND QDM INSTALLATION

Node 1 22. Tmpry stow ISS portable fire extinguisher in Node 1 fwd port alcove locker.

23. Tmpry stow shuttle QDMs (two) in TBD location.

NODE 1 PORTABLE FAN CONFIG

Node 1 24. Remove Portable Fans left on brackets.
Stow in 'Return to Houston' Bag.
Retrieve Portable Fans (four) from Bag.
Install on seat track according to Figure 1.

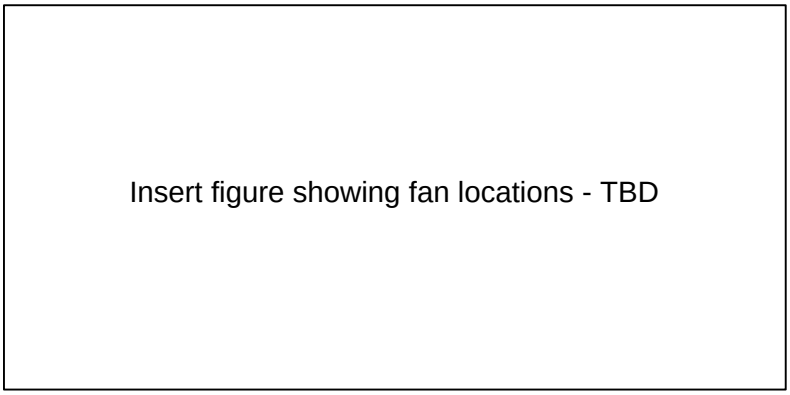

Figure 1.

NODE 1 PPRV CONFIGURATION

Node 1 25. Unstow: PPRV Caps

Node 1 Port, Stbd Hatch 26. Install caps (two) on Node 1 Port, Stbd PPRVs

VERIFY AND CONFIGURE NODE 1 INTERIOR LIGHTS

Node 1 Fwd Encone 27. √All Node 1 Interior Lights (eighty) - Full Bright

Node 1 28. NOD1OS2 - 1 Int Light pb → Off
NOD1OP2 - 1 Int Light pb → Off
NOD1OP2 - 2 Int Light pb → Off

NODE 1 INGRESS #2

TOOL AND EQUIPMENT REQUIRED
4 MRK Fans
16 Batteries

EQUALIZE WITH NODE 1

PMA 2 AFD
1. MPEV → Open

SPEC 66 ENVIRONMENT

2. When CABIN dP/dT < 0.01 (~1 minute)

4. MPEV → Close

3. Open Hatch per decal.

DUCTING CONFIGURATION

5. Remove V-band assembly and IMV cap from Node IMV Fwd Port duct flange.

NOTE
Node port is on the shuttle starboard side.

6. Tmpry stow V-band on Node Fwd Port IMV bulkhead feed through.

7. Tmpry stow cap on PMA 2 hard duct with Duct Tape.

8. Loosen V-band assembly restraining PMA 2 air duct jumper to support.

9. Connect end of PMA 2 air duct jumper to Node IMV Fwd Port duct flange with V-band clamp, tighten until secure.

ESTABLISH VENTILATION WITH NODE 1

Node 1 Fwd
10. Unstow Node 1 Fwd Port IMV valve handle.

11. Node 1 Fwd Port IMV valve → Open

12. Stow Node 1 Fwd Port IMV valve handle.

PMA 2
13. Close grille cover on PMA 2 hard duct.

14. √Airflow from Node through open hatchway.

PORTABLE LIGHTING CONFIGURATION

Node 1
15. Install Photo TV lighting in TBD location.

PORTABLE FAN CONFIGURATION

Node 1 16. Insert sixteen Batteries in four fans.

17. Fan Power (four) → High

18. √Fan RPM control position (four) - Full CW

19. √Fan is running

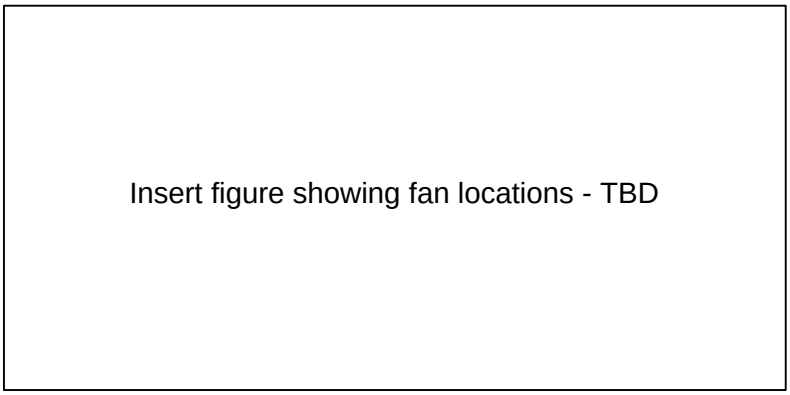

Figure 1.

PFE AND QDM INSTALLATION

Node 1 Locker 20. Tmpry stow ISS portable fire extinguisher in Node 1 fwd port Alcove.

21. Tmpry stow shuttle QDMs (two) in TBD location.

NODE 1 PPRV CONFIGURATION

Node 1 22. Unstow PPRV Caps.

Node 1 Port, Stbd Hatch 23. Install caps on Node 1 Port, Stbd PPRVs.

PMA 2 EGRESS

TOOLS AND EQUIPMENT REQUIRED
Ratchet Wrench
1/4” to 3/8” Adapter
3/8” to 1/4” Adapter
3/8” Universal Joint
TBD” Extension
Torque Wrench
7/16” Deepwell Socket
IMV caps (two)

MO13Q 1. ARLK/TNL FAN A(B) → Off

2. Disconnect shuttle/station air duct assembly from PMA 2 duct inlet.
Tmpry stow V-band clamp.

3. Install cap to PMA 2 hard duct inlet.
Secure flat band coupling with over-center latch.

Ext A/L 4. Disconnect shuttle/station air duct assembly from external A/L duct.
Leave handled clamp on external A/L duct.

5. Stow shuttle/station air duct assembly in PMA 2.
Secure assembly with TBD.

6. Connect external A/L duct to halo cross air duct.
Tighten clamp using handle until secure.

MO13Q 7. ARLK/TNL FAN A(B) → On
√Airflow at halo

8. Insert ODS air duct extension into vestibule.

9. √All equipment bags and returning items removed from PMA 2.

APAS HATCH CLOSURE

APAS Hatch 10. Egress PMA
Close APAS Hatch
Select ‘ÐÀÁ Î ×ÅÅ’ (WORKING) torque setting on hatch tool.
Insert tool in hatch socket.
Rotate tool 3-4 turns in direction of ‘ÝÀÊÐ’ (CLOSE) arrow until tool clicks.

****
* If tool prematurely slips or does not engage, *
* Select “ÀÂÀÐÉÉ Í Î Å” (EMERGENCY) *
* setting on hatch tool. *
* Reattempt to open Hatch. *
****

11. APAS EQUAL VLV → Open

INSTALL APAS DOCKING TARGET

12. Perform TBD procedure, (SODF: TBD), then:

ODS HATCH CLOSURE

13. Remove ODS air duct extension from vestibule.

ODS Hatch

14. Close ODS Hatch per decal.

15. √Equal vlv (two) - Off, capped

PMA 2 EGRESS #2

TOOLS AND EQUIPMENT REQUIRED
7/16” Open Ended Wrench
3/8” Drive, 30-200 in-lbs Torque Wrench
7/16” Deepwell Socket
IMV cap

WARNING

All umbilicals/connections between PMA 2 and Node 1 must be disconnected before 3A undocking.

1. Place PMA 2 - Node 1 duct extension in ‘Return to Houston’ Bag.

2. Clamp IMV cap to Node IMV bulkhead flange.
   Tighten V-band clamp to 120 --- 150 in-lbf.

MO13Q 3. ARLK/TNL FAN A/B - Off

PMA 2 Fwd 4. Unclamp shuttle/station air duct assembly PMA 2 duct inlet.

5. Clamp cap to PMA 2 hard duct inlet with over-center latch.

Ext A/L 6. Unscrew shuttle/station air duct assembly from external A/L duct.
   Leave handled clamp on external A/L duct.

7. Connect external A/L duct to halo cross air duct.
   Tighten clamp using handle until secure.

PMA 2 8. Stow shuttle/station air duct assembly in PMA 2.
   Secure assembly to handle with tie wraps.

9. ARLK/TNL FAN A(B) - On
   √Airflow at halo

10. √All equipment bags and returning items removed from PMA 2

APAS HATCH CLOSURE

APAS Hatch 11. Egress PMA
   Close APAS Hatch
   Select ‘ÐÀÁ Î ×ÅÅ’ (WORKING) torque setting on hatch tool.
   Insert tool in hatch socket.
   Rotate tool 3-4 turns in direction of ‘ÝÀÊÐ’ (CLOSE) arrow until tool clicks.

****
* If tool prematurely slips or does not engage *
* Select “ÀÂÀÐÅÉÉ Í Î Å” (EMERGENCY) setting *
* on hatch tool. *
* Reattempt to open Hatch. *
****

12. APAS EQUAL VLV → Cl

INSTALL APAS DOCKING TARGET

13. Perform TBD procedure.

ODS HATCH CLOSURE

ODS Hatch

14. Close ODS Hatch per decal.

15. √Equal vlv (two) - Off, capped

DEPRESS VESTIBULE

A6L

16. √cb SYS PWR CNTL ESS 1BC(2CA) SYS 1(2) - Cl

17. SYS PWR MN A(B) SYS 1(2) → On (tb - On)

18. cb DEP MN A(B) SYS 1(2) VENT ISOL → Cl

19. cb DEP MN A(B) SYS 1(2) VENT → Cl

20. VEST DEP VLV SYS 1(2) VENT ISOL → Op (tb - Op)

21. VEST DEP VLV SYS 1(2) VENT → Op (tb - Op)

SM 167 DOCKING STATUS SM 066 ENVIRONMENT

22. When AIRLOCK-VEST P ~CABIN P (within 0.2 psid)
VEST DEP VLV SYS 1(2) VENT → Cl (tb - Cl)
ISOL → Cl (tb - Cl)

PMA 2 INGRESS

TOOLS AND EQUIPMENT REQUIRED

Unstow, place in tool bag**:**

- APAS Hatch Tool (2)
- Alcohol Pads (for APAS hatch seal)
- Station Portable Fire Extinguisher (CO_2 bottle)
- D-Cell BATTs (16)
- Air Sample Bottles (4)
- Desiccant/Shroud Assemblies (4)
- Spotlight
- Towel
- 4-inch Ratchet Wrench, 1/4" Drive
- TBD-inch extension, 1/4" Drive
- 1/4" to 3/8" Adapter, 1/4" Drive
- 7/16" Deepwell Socket, 1/4" Drive
- 5/32" Hex Head Driver, 1/4" Drive
- Universal Joint, 3/8" Drive
- 4-inch Adjustable Wrench
- General Purpose Tape (2")
- Nylon Wire Tie Wraps
- Tie Wrap Cutting Tool
- Connector Pliers
- Short Flat Tip Screw Driver
- Velcro

Unstow**:**

- Portable Fan Assemblies (4)
- ISS O_2 Extension Segments (2)
- FGB Harmful Contaminants Filter Cartridge
- Empty 'Return to Houston' Bag

SETUP QDMS FOR INGRESS CONTINGENCY SUPPORT

1. Retrieve ISS O_2 Extension Segments (two).
   Disconnect two QDMs from existing O_2 lines.
   Connect a QDM to one end of each of the ISS O_2 Extension Segments.

C7 2. √LEH O_2 SPLY 1,2 Vlv (two) - Op

MO32M LEH O_2 7,8 Outlet (two) → Connect free end of one QDM/ISS O_2 Extension Segment to each outlet
LEH O_2 7,8 Vlv (two) → Op

3. Route both QDM/ISS O_2 Extension Segments to Ext A/L.

SETUP EXTERNAL AIRLOCK FOR ODS AND PMA INGRESS

4. Relocate Tool Bag, shuttle/station Air Duct Assembly, PMA IMV Duct Extension, and Portable Fan Assemblies, 'Return to Houston' Bag to Ext A/L.

A6L (A7L)

5. cb Depress MN A(B) SYS 1(2) Vent → Cl
   cb Depress ESS1BC(2CA) SYS 1(2) Vent ISOL → Cl
   √VEST DEP VLV SYS 1(2) VENT - Cl (tb-Cl)
   ISOL → Cl (tb-Cl)
   cb Depress MN A(B) SYS 1(2) Vent → Op
   cd Depress ESS1BC(2CA) SYS 1(2) Vent ISOL → Op

NOTE
Expect possible dP/dt klaxon if vestibule requires repressurization.

ODS Hatch

6. EQUAL VLV (one) → Norm
   √ODS Hatch ΔP ≤ 0.2 psid

INGRESS ODS VESTIBULE

7. Open ODS hatch per decal.
   EQUAL VLV (one) → Off
   Install cap.

CAUTION
Surfaces may be below freezing for a short time after initial ODS Hatch opening. Avoid direct contact with vestibule surfaces until SHUTTLE VESTIBULE TEMP 1,2 (two) indicate > 40 degF (SM 211 DM STATUS ODS INTERFACE).

Insert ODS air duct extension into vestibule.
Wipe any condensate from vestibule volume using the towel.

8. √**MCC-H** 'Go for PMA 2 Ingress'.

OPEN APAS HATCH

PMA 2 APAS Hatch

9. Select 'ÐÀÁ Î ×ÅÅ' (WORKING) torque setting on APAS Hatch Tool.
   Insert tool in hatch socket.
   Rotate tool 3-4 turns in direction of ' Î ÒÊÐ' (Open) arrow until it clicks.

```
**********************************************************************
*  If tool prematurely slips or does not engage                      *
*       Select 'ÀÂÀÐÅÉÉ Í Î Å' (EMERGENCY) setting on                  *
*         hatch tool                                                 *
*       Reattempt to open Hatch.                                     *
**********************************************************************
```

Remove tool.
Open Hatch.
Tether tool on hatch handle.
Secure Hatch in open position using fixing device.

EXT A/L

10. Cut and remove tie-wrap holding air inlet flex duct to halo cross using Tie-Wrap Cutting Tool.
Disconnect air inlet flex duct from halo cross air duct.
Obtain shuttle/station Air Duct Assembly stowed in PMA 2.
Remove handled clamp from shuttle/station Air Duct Assembly.
Install handled clamp over end of air inlet flex duct.

11. Insert male end of male/female duct adapter on shuttle/station Air Duct Assembly into end of air inlet flex duct.
Tighten clamp using handle until secure.
Secure assembly across the adapter using fabric straps/snaps.
Secure shuttle/station Air Duct Assembly with TBD to TBD.

PMA 2

12. Remove band clamp and cap from PMA 2 hard duct.
Stow cap on side of hard duct with pre-positioned Velcro.
Connect free end of shuttle/station Air Duct Assembly to PMA 2 hard duct inlet with band clamp.
Secure band clamp with over-center latch.

13. Remove Velcro strap from PMA 2 hard duct grille assembly (near duct connection just made).

14. Verify grille cover open.

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EPS PROCEDURES

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PCU CONDITION CATHODE

NOTE
Prior to commanding the cathode condition routine, the xenon purge must be shutdown for a minimum of 12 hours.

1. SUPPLY POWER AND ENABLE RT TO PCU

PCS
Z1: EPS
'PCU 1 (2)'

If PCU 1(2) - not Active
sel PCU 1(2)

PCU 1 (2)

sel RPC 15
cmd Close **Execute**
√Position - Cl

Node 1: C&DH: MDM N1-2
Primary NCS MDM Node1

sel UB EPS_N1-23 (14)
sel RT Status
sel Ena_Inh RT Commands
cmd Ena_PCU_1(2) **Execute**

2. VERIFY PCU STATUS

NOTE
If these conditions are not met, the condition cathode command will be rejected.

sel PCU 1(2)

PCU 1 (2)

√Operational Status - Shutdwn
√Discharge Pressure < 20.7 kPa
√Cathode Cndtng Seq Indicator - <blank>

3. CATHODE CONDITIONING ROUTINE
sel Operational Status
cmd PCU_1(2)_Cathode_Cndtng_Seq_Arm
cmd PCU_1(2)_Cathode_Cndtng_Seq
√Operational Status - Condition Cathode Routine

NOTE

1. Xenon preheating may require 10 to 200 hours before reaching operating temperature. The cathode conditioning sequence will not start until the tank reaches operating temperature.

2. Cathode conditioning may require 5 to 6 hours.

√Operational Status - Shutdwn
√Cathode Cndtng Seq Indicator - Complete

PCU VALVE CLOSURE

1. VERIFY NCS STATUS

PCS Node 1: EPS Software NCS

EPS Software NCS

'MDM N1-2'

If State - Primary

√PCU Control Ena - Ena

√PCU Control Init - Init

If State - not Primary

'MDM N1-1'

√PCU Control Ena - Ena

√PCU Control Init - Init

```
**************************************
*  sel SW Config                     *
*                                    *
*  NCS Software Configuration        *
*  'PCU Control'                     *
*                                    *
*  cmd Enable  Execute               *
**************************************
```

2. SUPPLY POWER TO PCUs

Z1: EPS

sel PCU 1(2)

PCU 1 (2)

sel RPC 15

cmd Close **Execute**

√Position - Cl

3. VERIFY INITIAL PCU STATUS

'PEU'

√Operational Status - Purge

√Integration Counter - Incrementing

4. CLOSE PCU VALVES

sel Operational Status

cmd PCU_1(2)_to_Shutdwn_Arm

cmd PCU_1(2)_to_Shutdwn

√Latch Vlv 1 - Cl

Wait for Discharge Pressure < 228.9 kPa.

√Latch Vlv 2 - Cl
√Operational Status - Shutdwn
Record Time: __/___:___:___ GMT.

5. REMOVE POWER FROM PCUs

NOTE
1. If station/shuttle unmating power requirements allow, leave PCUs on for 3A increment cathode conditioning.
2. Cathode conditioning procedure can be performed if conditions allow. Twelve (12) hours must have elapsed since valve closure.

Node 1: C&DH: MDM N1-2
Primary NCS MDM Node1

sel UB EPS_N1-23 (14)
sel RT Status
sel Ena_Inh RT Commands

cmd Inhib_PCU_1(2) **Execute**
√RT Inhibit 28 - Inh

Z1: EPS

sel PCU 1(2)

PCU 1 (2)

sel RPC 15
cmd Open **Execute**
√Position - Op

RACU ACTIVATION

1. VERIFY FGB COMMAND STATUS

NOTE
RACU commands sent from orbiter will not work if FGB relay matrix is in **MCC-M** command state (COMMANDING - INH). Crew can follow ground activities using the "If ENA" block below.

CRT SM 204 FGB

√COMMANDING - INH

2. If COMMANDING - INH

   Shuttle ⇓ **MCC-H**: "Ready for RACU5(6) Power On."
   MCC-H ⇒ **MCC-M**: "Go for RACU5(6) Power On."

RUSSIAN GROUND	AOS	LOS
Pass 1	___/___:___:___	___/___:___:___
Pass 2	___/___:___:___	___/___:___:___

   MCC-M ⇒ **MCC-H** ⇑ shuttle: "RACU5(6) Power On at ___/___:___:___ GMT."

3. If COMMANDING - ENA

   Shuttle ⇓ **MCC-H**: "Ready for RACU5(6) Power On."
   MCC-M ⇒ **MCC-H**: "Go for RACU5(6) Power On."
   MCC-H ⇑ shuttle: "Go for RACU5(6) Power On."

   On MCC GO

CRT SM 204 FGB

PCS nav FGB: EPS
FGB: EPS

√FGB Main Bus Voltage 1,2 (two): 28.0 --- 29.0 V
√FGB Batt Voltage 1 --- 6 (six) > 25.5 V

```
**************************************************
*  If any FGB Batt Voltage < 25.5 Volts, then    *
*       Notify MCC:  "FGB Batteries Low."        *
*       Wait 1 orbit for FGB batteries to charge. *
**************************************************
```

CRT SM 210 NODE

√FRM CTR - Incrementing

If FRM CTR - Static

SM 204 FGB

RACU 5(6) PWR ON VIA FGB - ITEM 1 (ITEM 3) EXEC
√RACU 5(6) Power On - *
√Input Amps > 3.0 A
√Output Volts: 121 --- 125 V
√Amps: 0.3 --- 10 A

NOTE
Amperage should be at 0.5 amps at power On. Amperage could be as high as 10 amps after MDM initialization (approximately 2.5 minutes), depending on heater usage.

****
* If RACU 5(6) OUT AMPS > 10 *
* RACU 5(6) PWR OFF VIA FGB - ITEM 5 *
* (ITEM 7) EXEC *
****

If FRM CTR - Incrementing

SM 204 FGB

RACU 5(6) PWR ON VIA NCS - ITEM 2 (ITEM 4) EXEC
√RACU 5(6) Power On - *
√Input Amps > 3.0 A
√Output Volts: 121 --- 125 V
√Amps: 0.3 --- 10 A

NOTE
Amperage should be at 0.5 amps at power On. Amperage could be as high as 10 amps after MDM initialization (approximately 2.5 minutes), depending on heater usage.

****
* If RACU 5(6) OUT AMPS > 10 *
* RACU 5(6) PWR OFF VIA FGB - ITEM 6 *
* (ITEM 8) EXEC *
****

PCS

nav FGB: EPS

FGB: EPS

sel RACU Details
sel Commands
cmd FGB RACU5(6) - On **Execute**
√RACU 5(6) Converter - On
√RACU 5(6) Converter Input Current > 3.0 A
√Output Current: 0.5 --- 10 A
Voltage: 121 --- 125 V

NOTE

Amperage should be at 0.5 amps at power On. Amperage could be as high as 10 amps after MDM initialization (approximately 2.5 minutes), depending on heater usage.

****
* If RACU 5(6) Output Current > 10 *
* sel Commands *
* **cmd** FGB RACU 5(6) - Off **Execute** *
****

RACU 5 DEACTIVATION

NOTE
This procedure assumes that MDM N1-2 is Primary and MDM N1-1 is Secondary.

1. INHIBIT NCS AUTORETRY

PCS Node 1: C&DH: MDM N1-1
Secondary NCS MDM Node1
'Software Control'

sel MDM Utilities

'Auto Retry'

cmd Inhibit **Execute**

√Auto Retry - Inh

2. COMMAND N1-2 TO DIAGNOSTICS

NOTE
1. Expect 'Disconnect' message on PCS. 2. Possible PDI DECOM Fail message.

Node 1: C&DH: MDM N1-2
Primary NCS MDM Node1

sel Major State Transitions

'N1-2'

cmd Authorize Transition to Diagnostic State **Execute**
cmd Trasnsition to Diagnostic State **Execute**

3. TELEMETRY RECOVERY ON OIU

CRT SM 212 OIU

BUS 4 BC - ITEM 15 EXEC (*)
BUS 3 RT - ITEM 10 EXEC (*)
Change OIU N1 Phys Dev to N1-1 - ITEM 18 +4 EXEC

Wait 1 minute from diagnostic command.

CRT Reload OIU Format 2 - ITEM 1 +2 EXEC

4. TELEMETRY RECOVERY ON PCS

PCS On PCS attached to PDIP N1-2 port

sel icon to open PCS CDS Main Control Panel Window
√Status box - yellow
sel 'Connect to MDM'
√Status box - green

Verify 'connected to MDM' indicated

Home page will display when load complete (~1 minute).

NOTE
Expect PCS FDA 'CDH MDM N1-1 Detected RT Fail MDM N1-2 - PMA1'.

Node 1: C&DH: MDM N1-1
Primary NCS MDM Node1
'MDM Major State'

√State - Primary

****
* If State not Primary or no N1-1 TLM *
* *
* √**MCC** *
****

5. REMOVE POWER FROM N1-2 MDM AT RPC

NOTE
Expect PCS FDA (LED and message only) when MDM power removed.

Node 1: C&DH: MDM N1-2
Secondary NCS MDM Node1
'RPCM N1RS2 C'

sel RPC 13
cmd Open **Execute**
√Position - Op

6. DISABLE RT DEVICES I/O ON EPS BUSES

PCS Node 1: C&DH: MDM N1-1
Primary NCS MDM Node1

sel UB EPS_N1 23
sel RT Status

cmd Inhib_RPCM_N1RS2_A **Execute**
cmd Inhib_RPCM_N1RS2_B **Execute**
cmd Inhib_RPCM_N1RS2_C **Execute**
cmd Inhib_RPCM_Z13B_A **Execute**
cmd Inhib_RPCM_Z13B_B **Execute**

PRIM_EPS_N1_23_RT Status

√RT Inhibit 11, 12, 18, 19, 20 (five) - Inh

7. COMMAND FGB RACU 5 OFF

NOTE
RACU commands sent from orbiter will not work if FGB relay matrix is in **MCC-M** command state (COMMANDING - INH). Crew can follow ground activities using the "If ENA" block below.

CRT SM 204 FGB

√COMMANDING - INH (Moscow Commanding)

If COMMANDING - INH

Crew ⇓ **MCC-H**: "Ready for RACU 5 Power Off."
MCC-H ⇒ **MCC-M**: "Go for RACU 5 Power Off."

RUSSIAN GROUND	AOS	LOS
Pass 1	___/___:___:___	___/___:___:___
Pass 2	___/___:___:___	___/___:___:___

MCC-M ⇒ **MCC-H** ⇑ crew: "RACU 5 Powered Off at __/___:___:__GMT."

If COMMANDING - ENA

MCC-M ⇒ **MCC-H**: "Go for RACU 5 Power Off."
MCC-H ⇑ crew: "Moscow GO for RACU 5 Power Off."

On MCC GO:

MCDS SM 204 FGB

RACU 5 Power OFF VIA NCS - ITEM 6 EXEC
√RACU 5 Input Amps < 2.0 A
√Output Volts ~0.0 V
√RACU 5 Power Off - ∗

PCS

nav FGB: EPS
FGB: EPS: RACU Details
RACU Details

sel Commands
cmd RACU 5 - Off **Execute**
√RACU 5 Converter - Off
√RACU 5 Input Current < 2.0 A
√Output Voltage ~0.0 V

RACU 6 DEACTIVATION

NOTE
This procedure assumes that MDM N1-2 is Primary and MDM N1-1 is Secondary.

1. INHIBIT NCS AUTORETRY

PCS Node 1: C&DH: MDM N1-2
Primary NCS MDM Node1
'Software Control'

sel MDM Utilities

'Auto Retry'

cmd Inhibit **Execute**

√Auto Retry - Inh

2. COMMAND N1-1 TO DIAGNOSTICS

NOTE
Expect PCS FDA 'CDH MDM N1-2 detected RT fail MDM N1-1 - PMA1'.

Node 1: C&DH: MDM N1-1
Secondary NCS MDM Node1

sel Major State Transitions

'N1-1'

cmd Authorize Transition to Diagnostic State **Execute**
cmd Trasnsition to Diagnostic State **Execute**

3. REMOVE POWER FROM N1-1 MDM
'RPCM N1RS1 A'

sel RPC 11
sel Commands
cmd Open **Execute**
√Position - Op

4. DISABLE RT DEVICES I/O ON EPS BUSES

PCS Node 1: C&DH: MDM N1-2
Primary NCS MDM Node1

sel UB EPS_N1-14
sel RT Status

cmd Inhib_RPCM_N1RS1_A **Execute**
cmd Inhib_RPCM_N1RS1_B **Execute**
cmd Inhib_RPCM_N1RS1_C **Execute**
cmd Inhib_RPCM_Z14B_A **Execute**
cmd Inhib_RPCM_Z14B_B **Execute**

RT Status

√RT Inhibit 11, 12, 18, 19, 20 (five) - Inh

5. COMMAND FGB RACU 6 OFF

NOTE
RACU commands sent from orbiter will not work if FGB relay matrix is in **MCC-M** command state (COMMANDING - INH). Crew can follow ground activities using the "If ENA" block below.

CRT SM 204 FGB

√COMMANDING - INH (Moscow Commanding)

If COMMANDING - INH

Crew ⇓ **MCC-H**: "Ready for RACU 6 Power Off."
MCC-H ⇒ **MCC-M**: "Go for RACU 6 Power Off."

RUSSIAN GROUND	AOS	LOS
Pass 1	___/___:___:___	___/___:___:___
Pass 2	___/___:___:___	___/___:___:___

MCC-M ⇒ **MCC-H** ⇑ crew: "RACU 6 Powered Off at __/___:___:__ GMT."

If COMMANDING - ENA

MCC-M ⇒ **MCC-H** : "Go for RACU 6 Power Off."
MCC-H ⇑ crew: "Moscow GO for RACU 6 Power Off."

On MCC GO:

MCDS SM 204 FGB

RACU 6 Power OFF VIA NCS - ITEM 8 EXEC
√RACU 6 Input Amps < 2.0 A
√Output Volts: 0.0 V
√RACU 6 Power Off - ∗

PCS

nav FGB: EPS
FGB: EPS: RACU Details
RACU Details

sel Commands
cmd RACU 6 - Off **Execute**
√RACU 6 Converter - Off
√RACU 6 Input Current < 2.0 A
√RACU 6 Output Voltage ~0.0 V

RPC OPEN/CLOSE

RPC OPEN/CLOSE (FOR ONE RPC)

1. Close RPC

PCS nav Node 1: EPS: RPCM #### #

RPCM #### #

sel RPC [X] X = RPCs [1], [2], [3],…[18]

√Close Cmd - Ena

√**MCC-H**

cmd Close **Execute**

√Position - Cl

2. Open RPC

nav Node 1: EPS: RPCM #### #

RPCM #### #

sel RPC [X] X = RPCs [1], [2], [3],…[18]

√Open Cmd - Ena

√**MCC-H**

cmd Open **Execute**

√Position - Op

RPC OPEN/CLOSE (FOR MULTIPLE RPCs)

1. Close RPCs

PCS nav Node 1: EPS: RPCM #### #

RPCM #### #

sel RPCM Details

√RPC [N] Close Cmd - Ena

√**MCC-H**

sel RPC [N]

cmd Close **Execute**

√RPC [N] Position - Cl

Repeat for [N+1] [N+2]

2. Open RPCs

nav Node 1: EPS: RPCM #### #

RPCM #### #

sel RPCM Details
√RPC [N] Open Cmd - Ena

√**MCC-H**

sel RPC [N]

cmd Open **Execute**
√RPC [N] Position - Op

Repeat for [N+1] [N+2]

NODE 1 POWERDOWN AND RECOVERY

1. Obtain the powerdown target value from **MCC** and continue working the powerdown in order until the target value is reached.

2. Use the POWERUP column in reverse order to back out of the powerdown.

3. The POWERUP column will also be used to recover from an automatic Loadshed.

4. The loads for the major power users are presented below.

> NOTE
> During Node 1 Pre-Ingress Warm-up, Ingress, and Post Egress Dryout, the Node 1 and PMA1 Shell Heater power allocation and configuration will vary.

Equipment	dc Watts
PMA 3 Shell Heaters	0 W predicted
Node 1 Shell Heaters	0 W predicted Total for String B 1284 W
PMA 1 Shell Heaters	40 W predicted Total for String B 272 W
SPDA Rail Heaters	120 Watts
Z1 EEATCS Heaters	TBD Watts
Z1 DDCU Heaters	200 Watts
PCUs and Heaters	124 Watts
CMG Heaters	400 Watts
KU-Band and S-Band Heaters	290 Watts
Early Comm	340 W
MDM N1-1	70 --- 90 W
MDM N1-2	70 --- 90 W

	POWERDOWN	POWERUP
	NOTE Depending on the heater configuration, power usage may not decrease after every step.	
	1. POWER DOWN TARGET VALUE Obtain power down target value, XX, from **MCC-M** _____ kw Continue performing steps until RACU 5 Output Pwr, kW + RACU 6 Output Pwr, kW ≤ XX.	
PCS	2. INHIBIT PMA 3 A AND B SHELL HTRS Node 1: 3A USOS Powerdown Powerup - Display 1	**cmd** Ena Bu
	sel PMA 3 Htr [X] = 1 2 3 4 5 'Htr [X]A' **cmd** Inhibit √Htr[X]A Availability - Inh Repeat	**cmd** Ena Opr
	sel PMA 3 Htr [X] = 1 2 3 4 5 'Htr [X]B' **cmd** Inhibit √Htr[X]B Availability - Inh Repeat	
	Node 1: 3A USOS Powerdown Powerup - Display 1	
	√RACU 5 Output Pwr, kW + RACU 6 Output Pwr, kW ≤ XX kw >>	

POWERDOWN	POWERUP
3. INHIBIT NODE 1 A HTRS (1 --- 6) sel Node 1 Htrs 1 --- 6 [X] = 1 2 3 4 5 6 'Htr [X]A' **cmd** Inhibit √Htr[X]A Availability - Inh Repeat Node 1: 3A USOS Powerdown Powerup - Display 1 √RACU 5 Output Pwr, kW + RACU 6 Output Pwr, kW ≤ XX kw >>	**cmd** Ena Bu
4. INHIBIT NODE 1 B HTRS (1 --- 6) sel Node 1 Htrs 1 --- 6 [X] = 1 2 3 4 5 6 'Htr [X]B' **cmd** Inhibit √Htr[X]B Availability - Inh Repeat Node 1: 3A USOS Powerdown Powerup - Display 1 √RACU 5 Output Pwr, kW + RACU 6 Output Pwr, kW ≤ XX kw >>	**cmd** Ena Opr
5. INHIBIT NODE 1 A HTRS (7 --- 9) sel Node 1 Htrs 7 --- 9 [X] = 7 8 9 'Htr [X]A' **cmd** Inhibit √Htr[X]A Availability - Inh Repeat Node 1: 3A USOS Powerdown Powerup - Display 1 √RACU 5 Output Pwr, kW + RACU 6 Output Pwr, kW ≤ XX kw >>	**cmd** Ena Bu

POWERDOWN	POWERUP
6. INHIBIT NODE 1 B HTRS (7 --- 9) sel Node 1 Htrs 7 --- 9 [X] = 5 6 7 8 9 'Htr [X]B' **cmd** Inh √Htr[X]B Availability - Inh Repeat Node 1: 3A USOS Powerdown Powerup - Display 1 √RACU 5 Output Pwr, kW + RACU 6 Output Pwr, kW ≤ XX kw >>	**cmd** Ena Opr
7. INHIBIT PMA1 A AND B SHELL HTRS sel PMA1 Htr [X] = 1 3 4 5 'Htr [X]A' **cmd** Inhibit √Htr[X]A Availability - Inh Repeat	**cmd** Ena Bu
sel PMA 1 Htr [X] = 1 2 3 5 'Htr [X]B' **cmd** Inhibit √Htr[X]B Availability - Inh Repeat Node 1: 3A USOS Powerdown Powerup - Display 1 √RACU 5 Output Pwr, kW + RACU 6 Output Pwr, kW ≤ XX kw >>	**cmd** Ena Opr

POWERDOWN	POWERUP
8. DISABLE Z1 SPDA RAIL HEATERS 'SPDA Rail Htrs'	
sel Z1 [X] Htr A [X] = 3B 4B	
cmd Z1[X] Htr A Inh	**cmd** Htr A Ena BU
√Status - Inh	**cmd** Htr A Ena BU
Repeat	
'Z14B SPDA Rail Htrs'	
sel Z1 [X] Htr B [X] = 3B 4B	
cmd Z1[X] Htr B Inh	**cmd** Htr B Ena Opr
√Status - Inh	**cmd** Htr B Ena Opr
Repeat	
√RACU 5 Output Pwr, kW + RACU 6 Output Pwr, kW ≤ XX kw >>	
9. DISABLE Z1 EEATCS HEATERS 'EEATCS Htr RPCM Z13B B'	
cmd RPC 7 - Op	**cmd** Close
√Position - Op	
'EEATCS Htr RPCM Z14B B'	
cmd RPC 7 - Op	**cmd** Close
√Position - Op	

POWERDOWN	POWERUP
10. DISABLE Z1 DDCU HEATERS 'DDCU Htr RPCM Z13B B' sel RPC [X] [X] = 6 11 **cmd** RPC [X] - Op √Position - Op Repeat 'DDCU Htr RPCM Z14B B' sel RPC [X] [X] = 11 16 **cmd** RPC [X] - Op √Position - Op Repeat √RACU 5 Output Pwr, kW + RACU 6 Output Pwr, kW ≤ XX kw >>	**cmd** Close **cmd** Close
11. DISABLE PCUs AND HEATERS 'PCU 1 and PCU 2 Htr' sel RPC [X] [X] = 15 16 **cmd** RPC [X] - Op √Position - Op Repeat 'PCU 2 and PCU 1 Htr' sel RPC [X] [X] = 15 14 **cmd** RPC [X] - Op √Position - Op Repeat √RACU 5 Output Pwr, kW + RACU 6 Output Pwr, kW ≤ XX kw >>	**cmd** RPC 16 Close **cmd** RPC 14 Close

POWERDOWN	POWERUP
12. DISABLE CMG HEATERS 'CMG Htrs RPCM Z13B B' sel RPC [X] [X] = 10 12 **cmd** RPC [X] - Op √Position - Op Repeat 'CMG Htrs RPCM Z14B B' sel RPC [X] [X] = 10 12 **cmd** RPC [X] - Op √Position - Op Repeat √RACU 5 Output Pwr, kW + RACU 6 Output Pwr, kW ≤ XX kw >> 13. DISABLE KU-BAND AND S-BAND HEATERS 'KU - Band Htr RPCM Z14B B' sel RPC [X] [X] = 5 6 **cmd** RPC [X] - Op √Position - Op Repeat 'S - Band Htr RPCM Z14B B' sel RPC [X] [X] = 1 4 **cmd** RPC [X] - Op √Position - Op Repeat √RACU 5 Output Pwr, kW + RACU 6 Output Pwr, kW ≤ XX kw >>	**cmd** Close **cmd** Close **cmd** Close

POWERDOWN	POWERUP
14. DISABLE INTERNAL EARLY COMM EQUIPMENT NOTE The Early Comm equipment is powered by the stbd CBM RPCs. sel Display 2 - Early Comm and MDMs 'Early Comm RPCM N1RS2 A' sel RPC [X] [X] = 5 6 10 11 **cmd** RPC [X] - Op **Execute** √Position - Op Repeat √RACU 5 Output Pwr, kW + RACU 6 Output Pwr, kW ≤ XX kw >>	**cmd** Close **Execute**
15. TURN OFF EARLY COMM ANTENNAS AND ANTENNA HEATERS **CAUTION** The Early Comm Antennas may experience hardware damage after TBD hours without heater power. 'Early Comm RPCM N1RS1 C' sel RPC [X] [X] = 5 6 12 13 **cmd** RPC [X] - Op **Execute** √Position - Op Repeat √RACU 5 Output Pwr, kW + RACU 6 Output Pwr, kW ≤ XX kw >>	**cmd** Close **Execute**

POWERDOWN	POWERUP
16. POWERDOWN OF N1-1 MDM √**MCC-H** before powerdown of N1-1 MDM	
Inhibit NCS Autoretry 'N1 - 1 MDM RPCM N1RS1 A'	**cmd** Prime_NCS_Ena_ NCS_Retry **Execute**
cmd Prim_NCS_Inh_NCS_Retry **Execute** √Auto Retry Inhibit - X	√Auto Retry Inhibit - <blank>
Command N1-1 To Diagnostics NOTE Expect PCS FDA 'CDH MDM N1-2 Detected RT Fail MDM N1-1 - PMA1'.	
'N1 - 1 MDM RPCM N1RS1 A'	**cmd** N1_1_MDM_ Xsitn_Second_ state_Arm **Execute**
cmd N1_1_MDM_Xsitn_Dgnstc_State_ARM **Execute** **cmd** N1_1_MDM_Xsitn_Dgnstc_State **Execute**	**cmd** N1_1_MDM_ Xsitn_Second_ state **Execute**
Remove Power From N1-1 MDM and SDO Card sel RPC [X] [X] = 5 11	√State - Secondary
cmd RPC[X] - Op **Execute** √Position - Op	**cmd** Close **Execute**
Repeat	
Verify N1_2 MDM Survival Heater Off 'MDM N1_2 Srv Htr RPCM N1RS1 C'	
√RPC 2 Position - Op	
√RACU 5 Output Pwr, kW + RACU 6 Output Pwr, kW ≤ XX kw >>	

POWERDOWN	POWERUP
17. <u>POWERDOWN OF N1-2 MDM</u> √**MCC-H** before powerdown of N1-2 MDM 'N1_2 MDM RPCM N1RS2 C sel RPC [X] [X] = 15 3 13 **cmd** RPC[X] - Op **Execute** √Position - Op Repeat	√**MCC-H**

MCS PROCEDURES

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ACS ARRIVAL MODING

NOTE
For ISS assembly flight 3A, this procedure is to be performed by Ground Only.

1. VERIFY ACS MODING PRE-ARRIVAL CONFIGURATION AND STATUS

NOTE
Arrival Mode initialization should be performed one hour before entering the Orbiter prox-ops phase.

PCS MCS: ACS Moding
ACS Moding
'ACS Configuration'

√Moding Role Primary, Secondary NCS - Full

```
**********************************************************************
*  If Primary/Secondary NCS Moding Role is not set to Full,          *
*    then the following commands should be sent:                     *
*                                                                    *
*       sel Moding Role                                              *
*                                                                    *
*       cmd N1-1 - Arm                                               *
*       cmd N1-2 - Arm                                               *
*      √Arm Status Primary, Secondary NCS - Arm                      *
*                                                                    *
*       cmd N1-1 - Full                                              *
*       cmd N1-2 - Full                                              *
*      √Moding Role Primary, Secondary NCS - Full                    *
*      √Arm Status Primary, Secondary NCS - Disarm                   *
**********************************************************************
```

√RS Mode Primary, Secondary NCS - Cntl

'Arrival'

√PMA2 Arrival Response SW Primary, Secondary NCS - Inh

2. ENABLE APAS LED LIGHTING

PCS MCS: ACS Moding
ACS Moding

NOTE
Each of the primary and secondary commands turns on two of the four LED ACS indication lights (i.e., 4 total). LED configuration: On - Station Active Attitude Control, Off - Software Off, Flash - Station in Free-Drift.

‘ACS Configuration’

sel LED Control SW

‘Primary NCS’

cmd Enable
√LED Control SW - Ena
√PMA2 LED State - On

‘Secondary NCS’

cmd Enable
√LED Control SW - Ena
√PMA2 LED State - On

Visual verification by Orbiter crew that LED indicators are On (-Z window).

NOTE
If Orbiter crew determines LEDs are not on, verify with **MCC-H/MCC-M** that ISS is in active attitude control.

3. ENABLE ARRIVAL SOFTWARE SWITCH MONITORING FOR ACS MODING

‘Arrival’

sel PMA2 Arrival Response SW

‘Primary NCS’

cmd Enable
√Arrival SW - Ena

‘Secondary NCS’

cmd Enable
√Arrival SW - Ena

****
* If Primary/Secondary NCS Arrival Response SW Arm needs *
* to be inhibited (wave off, etc), then the following commands *
* should be sent: *
* *
* sel PMA 2 Arrival Response SW *
* *
* ‘Primary, Secondary NCS’ *
* *
* **cmd** Inhibit - Arm *
* √Arm Status - Arm *
* *
* **cmd** Inhibit *
* √PMA 2 Arrival SW - Inh *
√Arm Status - Disarm
****

4. ATTITUDE CONTROL SYSTEM ARRIVAL MONITORING AND MODING
Verify **MCC-H/MCC-M** Go for Orbiter Arrival/Docking

Monitor the following signals during the docking phase.

'Arrival'

√PMA2 Capture Long Primary, Secondary NCS - X

√Arrival Event Primary NCS - X
√Arrival Event Secondary NCS - X

'ACS Configuration'

√RS Mode - Drift

√PMA2 LED State Primary, Secondary NCS - Flash

Visual verification by Orbiter crew that LED indicators are Flashing (-Z window).

NOTE

1. If Orbiter crew determines LEDs are not flashing, verify with **MCC-H/MCC-M** that ISS is in Free Drift.

2. The following 'Departure' signals may take up to 17 minutes before occurring.

'Departure'

√PMA2 Interface Sealed Primary, Secondary NCS - X
√PMA2 Undocking Complete Primary, Secondary NCS - Blank

ACS DEPARTURE MODING

1. ENABLE DEPARTURE SWITCH MONITORING FOR ACS MODING

PCS MCS: ACS Moding

ACS Moding

'ACS Configuration'

√Moding Role Primary, Secondary NCS - Full

```
**********************************************************************
*  If Primary/Secondary NCS Moding Role is not set to Full,          *
*    then the following commands should be sent                      *
*                                                                    *
*       sel Moding Role                                              *
*                                                                    *
*       cmd N1-1 - Arm                                               *
*       cmd N1-2 - Arm                                               *
*     √Arm Status Primary, Secondary NCS - Arm                       *
*                                                                    *
*       cmd N1-1 - Full                                              *
*       cmd N1-2 - Full                                              *
*     √Moding Role Primary, Secondary NCS - Full                     *
*     √Arm Status Primary, Secondary NCS - Disarm                    *
**********************************************************************
```

'Departure'

sel PMA2 Departure Response SW

'Primary NCS'

cmd Enable Arm
√Arm Status - Arm
cmd Enable
√Departure SW - Ena
√Arm Status - Disarm

'Secondary NCS'

cmd Enable Arm
√Arm Status - Arm
cmd Enable
√Departure SW - Ena
√Arm Status - Disarm

2. VERIFY DEPARTURE EVENT SOFTWARE STATUS

'Departure'

√Departure Event Primary, Secondary NCS - Blank

3. ENABLE APAS LED LIGHTING

PCS MCS: ACS Moding

ACS Moding

NOTE
Each of the primary and secondary commands turns on two of the four LED ACS indication lights (i.e., 4 total). LED configurations: On - Active Attitude Control, Off - Power Off, Flash - ISS in Free Drift.

'ACS Configuration'

sel LED Control SW

'Primary NCS'

cmd Enable
√LED Control SW - Ena
√PMA2 LED State - Flash

'Secondary NCS'

cmd Enable
√LED Control SW - Ena
√PMA2 LED State - Flash

Visual verification by orbiter crew that LED indicators are flashing (-Z windows).

4. MONITOR NCS SEPARATION SIGNALS AND VERIFY ORBITER DEPARTURE AND POST SEPARATION LED MODE CHANGE

Perform CONFIGURATION C&DH FOR ORBITER UNDOCKING, all, (SODF: C&DH), then:

Verify **MCC-H/MCC-M** Go for orbiter departure.

NOTE

1. Monitor the change in parameter values during orbiter undocking. At orbiter separation (i.e., Undocking Complete is true and Interface Sealed is false), the attitude control countdown timer is initiated.

2. Monitor the Countdown Timer. The primary Departure Event is received when the Countdown Timer reaches zero. The occurrence of this event prompts the SM to reactivate its ACS system.

3. For flights 2A through 3A, orbiter crew interface will be lost at OIU disconnect.

The following will be conducted via ground control.

PCS MCS: ACS Moding

ACS Moding

'Departure'

√PMA2 Interface Sealed Primary, Secondary NCS - Blank

√PMA2 Undocking Complete Primary, Secondary NCS - X

√Countdown Timer Primary, Secondary NCS - (Decreasing)

√Departure Event Primary, Secondary NCS - X (when timer = 00:00)

5. VERIFY RUSSIAN SEGMANT MODE STATUS

'ACS Configuration'

√RS Mode Primary NCS - Cntl
√RS Mode Secondary NCS - Cntl

√PMA2 LED State Primary NCS - On
√PMA2 LED State Secondary NCS - On

Visual verification by orbiter crew that LED Indicators are On (-Z windows).

ACS POST ARRIVAL MODING

1. ACS POST ARRIVAL APAS LED MODING

PCS MCS: ACS Moding

ACS Moding

'ACS Configuration'

sel LED Control SW

'Primary NCS'

cmd Inhibit
√LED Control SW - Inh
√PMA 2 LED State - Off

'Secondary NCS'

cmd Inhibit
√LED Control SW - Inh
√PMA 2 LED State - Off

Visual check by Orbiter crew that APAS LEDs are Off (-Z window).

2. DISABLE ARRIVAL RESPONSE SOFTWARE

'Arrival'

sel PMA 2 Arrival Response SW

'Primary NCS'

cmd Inhibit Arm
√Arm Status - Arm
cmd Inhibit
√Arrival SW - Inh
√Arm Status - Disarm

'Secondary NCS'

cmd Inhibit Arm
√Arm Status - Arm
cmd Inhibit
√Arrival SW - Inh
√Arm Status - Disrm

ACS PRE-DEPARTURE MODING CONFIGURATION

NOTE
This procedure and the configuration of the Pending Back Off timer should be conducted a minimum of one hour before undocking. Program back off time default setting is 10 seconds.

1. VERIFY ACS MODING ROLE CONFIGURATION

PCS MCS: ACS Moding
ACS Moding
'ACS Configuration'

√Moding Role Primary, Secondary NCS - Full

```
**********************************************************************
*  If Primary/Secondary NCS Moding Role is not set to Full,  *
*    then the following commands should be sent              *
*                                                            *
*       cmd N1-1 - Arm                                       *
*       cmd N1-2 - Arm                                       *
*     √Arm Status Primary, Secondary NCS - Arm               *
*                                                            *
*       cmd N1-1 - Full                                      *
*       cmd N1-2 - Full                                      *
*     √Moding Role Primary, Secondary NCS - Full             *
*     √Arm Status Primary, Secondary NCS - Disarm            *
**********************************************************************
```

2. VERIFY RUSSIAN SEGMENT MODE STATUS
'ACS Configuration'

√RS Mode Primary, Secondary NCS - Drift

3. VERIFY INITIAL ACS HW SIGNAL CONFIGURATION
sel ACS Moding HW Signals

ACS Moding HW Signals
'Departure'

√PMA2 Interface Sealed N1-1, N1-2 NCS - X
√PMA2 Undocking Complete N1-1, N1-2 NCS - Blank

4. VERIFY NCS SOFTWARE DEPARTURE EVENT STATUS AND CONFIGURATION
sel ACS Moding

ACS Moding
'Departure'

√PMA 2 Interface Sealed Primary, Secondary NCS - X
√PMA 2 Undocking Complete Primary, Secondary NCS - Blank
√Departure Event Primary, Secondary NCS - Blank

5. SET PENDING BACK OFF TIMER FOR ORBITER DEPARTURE

ACS Moding
'Departure'

sel Pending Back Off Time

'Primary NCS'

cmd 10 Seconds
√Pending Back Off Time - 10
√Arm Status - Arm

'Secondary NCS'

cmd 10 Seconds
√Pending Back Off Time - 10
√Arm Status - Arm

```
**************************************************************************
*  If the Pending Back Off Time needs to be canceled or configured  *
*    later, disarm the current Pending Back Off Time as follows     *
*                                                                   *
*       sel Pending Back Off Time                                   *
*                                                                   *
*       'Primary, Secondary NCS'                                    *
*                                                                   *
*       cmd Incorporate Disarm                                      *
*     √Arm Status - Disarm                                          *
**************************************************************************
```

6. INCORPORATE PENDING BACK OFF TIME
'Departure'

sel Pending Back Off Time

'Primary NCS'

cmd Incorporate Pending Back Off Time
√Back Off Time - 10
√Arm Status - Disarm

'Secondary NCS'

cmd Incorporate Pending Back Off Time
√Back Off Time - 10
√Arm Status - Disarm

ACS POST DEPARTURE MODING CONFIGURATION

1. DISABLE APAS LED MODE INDICATION AND VERIFY LED STATUS

NOTE
The functions in this section are to occur following the end of the Orbiter Prox-Ops phase.

PCS MCS: ACS Moding

ACS Moding

'ACS Configuration'

sel LED Control SW

'Primary NCS'

cmd Inhibit
√LED Control SW - Inh
√PMA2 LED State - Off

'Secondary NCS'

cmd Inhibit
√LED Control SW - Inh
√PMA2 LED State - Off

2. DISABLE DEPARTURE RESPONSE

'Departure'

sel PMA 2 Departure Response SW

'Primary NCS'

cmd Inhibit
√Departure SW - Inh
√Arm Status - Disarm

'Secondary NCS'

cmd Inhibit
√Departure SW - Inh
√Arm Status - Disarm

CMG SURVIVAL HEATER ACTIVATION

1. CLOSE Z1 RPCs FOR CMG SURVIVAL HEATERS ACTIVATION

NOTE
Heater activation occurs in the following CMG pairs: 2 and 3, 1 and 4.

PCS Z1: EPS: RPCM Z14B B
RPCM Z14B B

sel RPC 10

'Load: CMG2 Surv Htr'

√RPC Close Cmd - Ena
cmd RPC Position - Close
√RPC Position - Cl

PCS Z1: EPS: RPCM Z14B B
RPCM Z14B B

sel RPC 12

'Load: CMG3 Surv Htr'

√RPC Close Cmd - Ena
cmd RPC Position - Close
√RPC Position - Cl

PCS Z1: EPS: RPCM Z13B B
RPCM Z13B B

sel RPC 10

'Load: CMG1 Surv Htr'

√RPC Close Cmd - Ena
cmd RPC Position - Close
√RPC Position - Cl

PCS Z1: EPS: RPCM Z13B B
RPCM Z13B B

sel RPC 12

'Load: CMG4 Surv Htr'

√RPC Close Cmd - Ena
cmd RPC Position - Close
√RPC Position - Cl

CMG SURVIVAL HEATER DEACTIVATION

1. OPEN Z1 RPCs FOR CMG SURVIVAL HEATERS DEACTIVATION

NOTE
Heater deactivation occurs in the following CMG pairs: 2 and 3, 1 and 4.

PCS Z1: EPS: RPCM Z14B B
RPCM Z14B B

sel RPC 10

'Load: CMG2 Surv Htr'

√RPC Open Cmd - Ena
cmd RPC Position - Open
√RPC Position - Op

PCS Z1: EPS: RPCM Z14B B
RPCM Z14B B

sel RPC 12

'Load: CMG3 Surv Htr'

√RPC Open Cmd - Ena
cmd RPC Position - Open
√RPC Position - Op

PCS Z1: EPS: RPCM Z13B B
RPCM Z13B B

sel RPC 10

'Load: CMG1 Surv Htr'

√RPC Open Cmd - Ena
cmd RPC Position - Open
√RPC Position - Op

PCS Z1: EPS: RPCM Z13B B
RPCM Z13B B

sel RPC 12

'Load: CMG4 Surv Htr'

√RPC Open Cmd - Ena
cmd RPC Position - Open
√RPC Position - Op

S&M PROCEDURES

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S&M

CBM MATE NODE 1 NADIR

OBJECTIVE:
Mate PMA 3 to Node 1 Nadir port using Common Berthing Mechanism (CBM)

LOCATION:
NOD1/AFD EPCS

DURATION:
TBD

REFERENCED PROCEDURE(S):
None

WARNING

To prevent damage to Active CBM (ACBM), free drift thruster inhibit is required from initiation of CBM capture latch operation until eight bolts reach tensile load of 6672 N/1500 lbs. SRMS shall remain grappled to PMA 3 until such time.

1. VERIFY PRIMARY AND SECONDARY RPCs CLOSED

PCS Node 1: S&M: Nadir CBM

Node 1 Nadir CBM Display

'RPCM N13B B Primary Power'

√RPC Posn (four) - Cl

Node 1 Nadir CBM Display

'RPCM N14B B Secondary Power'

√RPC Posn (four) - Cl

2. VERIFY CBM STATUS

Node 1 Nadir CBM Display

'CBM Status'

√Mode - Activated
√Master - Secondary
√Comm Error - No X
√Master Cmd Status - Complete

3. VERIFY READY TO LATCH INDICATORS (RTLs) CLOSED

NOTE

1. Step 3 is performed following SRMS translation of the PMA 3 into the CBM capture envelope.

2. Capture sequence may be initiated with three of four RTLs closed. In this case, the latch associated with the open RTL must be masked. The mask command for Latch X is accessed by selecting the Latch X button on the CBM depiction, selecting the Commands button from the pop-up window, and executing the Mask Latch X command.

Node 1 Nadir CBM Display
'Capture Latch Status'

√Posn (four): 199 --- 200

Node 1 Nadir CBM Display
'CBM Graphic'

√RTL (four) - green

4. PERFORM FIRST STAGE CAPTURE

Node 1 Nadir CBM Display
'Command Sets'

sel Mate

Node 1 Nadir CBM Mate

sel Capture First Stage

Node 1 CBM Capture First Stage

cmd Capture First Stage
√Confirmation Request - Capture

cmd Confirm Cmd
Wait 15 seconds.
√Master Cmd Status - Complete
√Cmd Code (four) - Capture
√Cmd Status (four) - Complete
√Posn (four): 148 --- 150

5. PERFORM SECOND STAGE CAPTURE

Node 1 Nadir CBM Mate

sel Capture Second Stage

Node 1 CBM Capture Second Stage

cmd Capture Second Stage
√Confirmation Request - Capture

cmd Confirm Cmd
Wait 60 seconds.
√Master Cmd Status - Complete
√Cmd Code (four) - Capture
√Cmd Status (four) - Complete
√Posn (four): 6 --- 8

6. ACQUIRE FIRST SET OF FOUR BOLTS

Node 1 Nadir CBM Mate

sel First Four

Node 1 CBM Acquire First Four Bolts

cmd ABolts First Four
√Confirmation Request - ABolts

cmd Confirm Cmd
Wait 6 minutes.
√Master Cmd Status - Complete
√Cmd Code (four) - ABolts
√Cmd Status (four) - Complete
√Load (four): 0 --- 6700

7. ACQUIRE SECOND SET OF FOUR BOLTS

Node 1 Nadir CBM Mate

sel Second Four

Node 1 CBM Acquire Second Four Bolts

cmd ABolts Second Four
√Confirmation Request - ABolts

cmd Confirm Cmd
Wait 6 minutes.
√Master Cmd Status - Complete
√Cmd Code (four) - ABolts
√Cmd Status (four) - Complete
√Load (four): 0 --- 6700

NOTE
Step 8 is performed following 12 hour thermal hold that begins with completion of step 7.

8. ACQUIRE THIRD SET OF FOUR BOLTS

Node 1 Nadir CBM Mate

sel Third Four

Node 1 CBM Acquire Third Four Bolts

cmd ABolts Third Four
√Confirmation Request - ABolts

cmd Confirm Cmd
Wait 6 minutes.
√Master Cmd Status - Complete
√Cmd Code (four) - ABolts
√Cmd Status (four) - Complete
√Load (four): 0 --- 6700

9. ACQUIRE FINAL SET OF FOUR BOLTS

Node 1 Nadir CBM Mate

sel Last Four

Node 1 CBM Acquire Last Four Bolts

cmd ABolts Last Four
√Confirmation Request - ABolts

cmd Confirm Cmd
Wait 6 minutes.
√Master Cmd Status - Complete
√Cmd Code (four) - ABolts
√Cmd Status (four) - Complete
√Load (four): 0 --- 6700

10. PERFORM INTERMEDIATE TORQUING FIRST STAGE

Node 1 Nadir CBM Mate

sel First Stage

Node 1 CBM Intermediate Torque First Stage

cmd IBolt First Stage
√Confirmation Request - IBolt

cmd Confirm Cmd
Wait 2 minutes.
√Master Cmd Status - Complete
√Cmd Code (sixteen) - IBolt
√Cmd Status (sixteen) - Complete
√Load (sixteen): 0 --- 11150

11. PERFORM INTERMEDIATE TORQUING SECOND STAGE

Node 1 Nadir CBM Mate

sel Second Stage

Node 1 CBM Intermediate Torque Second Stage

cmd IBolt Second Stage
√Confirmation Request - IBolt

cmd Confirm Cmd
Wait 2 minutes.
√Master Cmd Status - Complete
√Cmd Code (sixteen) - IBolt
√Cmd Status (sixteen) - Complete
√Load (sixteen): 0 --- 15600

12. PERFORM INTERMEDIATE TORQUING THIRD STAGE

Node 1 Nadir CBM Mate

sel Third Stage

Node 1 CBM Intermediate Torque Third Stage

cmd IBolt Third Stage
√Confirmation Request - IBolt

cmd Confirm Cmd
Wait 2 minutes.
√Master Cmd Status - Complete
√Cmd Code (sixteen) - IBolt
√Cmd Status (sixteen) - Complete
√Load (sixteen): 0: --- 20050

13. PERFORM INTERMEDIATE TORQUING FOURTH STAGE

NOTE
Following Fourth Stage of the intermediate torque sequence, all 16 bolts should have preload in the range of 23400 --- 24500 N. Otherwise, step 13 should be repeated until all 16 bolts achieve the specified preload.

Node 1 Nadir CBM Mate

sel Fourth Stage

Node 1 CBM Intermediate Torque Fourth Stage

cmd IBolt Fourth Stage
√Confirmation Request - IBolt

cmd Confirm Cmd
Wait 2 minutes.
√Master Cmd Status - Complete
√Cmd Code (sixteen) - IBolt
√Cmd Status (sixteen) - Complete
√Load (sixteen): 23400 --- 24500 else repeat step 13

14. PERFORM INTERMEDIATE TORQUING LAST STAGE

NOTE
Following Last Stage of the intermediate torque sequence, all 16 bolts should have preload in the range of 45650 --- 46750 N. Otherwise, step 14 should be repeated until all 16 bolts achieve the specified preload.

Node 1 Nadir CBM Mate

sel Last Stage

Node 1 CBM Intermediate Torque Last Stage

cmd IBolt Last Stage
√Confirmation Request - IBolt

cmd Confirm Cmd
Wait 2 minutes.

√Master Cmd Status - Complete
√Cmd Code (sixteen) - IBolt
√Cmd Status (sixteen) - Complete
√Load (sixteen): 45650 --- 46750 else repeat step 14

15. PERFORM FINAL TORQUING SEQUENCE

NOTE
Following the final torque sequence, all 16 bolts should have preload in the range of 84800 --- 85900 N. Otherwise, step 15 should be repeated until all 16 bolts achieve the specified preload.

Node 1 Nadir CBM Mate

sel Final Torque

Node 1 CBM Final Torque

cmd FBolt Nominal
√Confirmation Request - Fbolt

cmd Confirm Cmd
Wait 2 minutes.
√Master Cmd Status - Complete
√Cmd Code (sixteen) - FBolt
√Cmd Status (sixteen) - Complete
√Load (sixteen): 84800 --- 85900 else repeat step 15

16. CLOSE CAPTURE LATCHES

Node 1 Nadir CBM Mate

sel Close Latches

Node 1 CBM Close Capture Latches

cmd Close
Wait 10 seconds.
√Confirmation Request - Close

cmd Confirm Cmd
√Master Cmd Status - Complete
√Cmd Code (four) - Close
√Cmd Status (four) - Complete
√Posn (four): 0 --- 1

17. DEACTIVATE NADIR CBM MASTER CONTROLLER

Node 1 Nadir CBM Mate

sel Deactivate Nadir CBM

Node 1 Nadir CBM Deactivate CBM

cmd Deactivate
Mode - Deactivated
Master - None

18. OPEN PRIMARY RPCs

Node 1 Nadir CBM Mate

sel RPC 03

RPCM N13B B RPC 03

cmd Open **Execute**
√Position - Open

Node 1 Nadir CBM Mate

sel RPC 04

RPCM N13B B RPC 04

cmd Open **Execute**
√Position - Open

Node 1 Nadir CBM Mate

sel RPC 05

RPCM N13B B RPC 05

cmd Open **Execute**
√Position - Open

Node 1 Nadir CBM Mate

sel RPC 06

RPCM N13B B RPC 06

cmd Open **Execute**
√Position - Open

19. OPEN SECONDARY RPCs

Node 1 Nadir CBM Mate

sel RPC 11

RPCM N14B B RPC 11

cmd Open **Execute**
√Position - Open

Node 1 Nadir CBM Mate

sel RPC 12

RPCM N14B B RPC 12

cmd Open **Execute**
√Position - Open

Node 1 Nadir CBM Mate

sel RPC 13

RPCM N14B B RPC 13

cmd Open **Execute**
√Position - Open

Node 1 Nadir CBM Mate

sel RPC 14

RPCM N14B B RPC 14

cmd Open **Execute**
√Position - Open

CBM MATE NODE 1 ZENITH

OBJECTIVE:
Mate Z1 TRUSS to Node1 Zenith port using Common Berthing Mechanism (CBM).

LOCATION:
NOD1/AFD EPCS

DURATION:
TBD

REFERENCED PROCEDURE(S):
Z1 INSTALL (PDRS OPERATIONS CHECKLIST)

WARNING

To prevent damage to Active CBM (ACBM), free drift thruster inhibit is required from initiation of CBM capture latch operation until eight bolts reach tensile load of 6672 N/1500 lbs. SRMS shall remain grappled to Z1 TRUSS until such time.

1. VERIFY SECONDARY RPCs CLOSED

PCS Node 1: S&M: Zenith CBM

Node 1 Zenith CBM Display

'RPCM N14B B Secondary Power'

√RPC Posn (four) - Cl

2. VERIFY CBM STATUS

Node 1 Zenith CBM Display

'CBM Status'

√Mode - Activated
√Master - Secondary
√Comm Error - No X
√Master Cmd Status - Complete

'Capture Latch Status'

√Posn (four) = 205

'CBM Graphic'

√RTL (four) - gray

NOTE
Step 3 is performed following SRMS translation of the Z1 TRUSS into the CBM capture envelope.

3. VERIFY READY TO LATCH INDICATORS (RTLs) CLOSED

NOTE
Capture sequence may be initiated with three of four RTLs closed. In this case, the latch associated with the open RTL must be masked. The mask command for Latch X is accessed by selecting the Latch X button on the CBM depiction, selecting the Commands button from the pop-up window, and executing the Mask Latch X command.

√Step 3 of Z1 INSTALL complete (PDRS Checklist)

Node 1 Zenith CBM Display
'CBM Graphic'

√RTL (four) - green

4. PERFORM FIRST STAGE CAPTURE
DAP: √FREE

Node 1 Zenith CBM Display
'Command Sets'

sel Mate

Node 1 Zenith CBM Mate

sel Capture First Stage

Node 1 CBM Capture First Stage

cmd Capture First Stage
√Confirmation Request - Capture
cmd Confirm Cmd
Wait 15 seconds.

√Master Cmd Status - Complete
√Cmd Code (four) - Capture
√Cmd Status (four) - Complete
√Posn (four): 148 --- 150

5. PERFORM SECOND STAGE CAPTURE

√Step 4 of Z1 INSTALL complete (PDRS Checklist)

Node 1 Zenith CBM Mate

sel Capture Second Stage

Node 1 CBM Capture Second Stage

cmd Capture Second Stage
√Confirmation Request - Capture
cmd Confirm Cmd
Wait 60 seconds.

√Master Cmd Status - Complete
√Cmd Code (four) - Capture
√Cmd Status (four) - Complete
√Posn (four): 6 --- 8

6. PREPOSITION FIRST SET OF FOUR BOLTS

√Step 5 of Z1 INSTALL complete (PDRS Checklist)

Node 1 Zenith CBM Mate

sel Position First Four Bolts

Node 1 CBM Position First Four Bolts

cmd Position First Four
√Confirmation Request - ABolts

cmd Confirm Cmd
Wait 1 minute.
√Master Cmd Status - Fail
√Cmd Code (four) - ABolts or Stop
√Cmd Status (four) - Not Engaged or Complete
√Load (four): 0

cmd Stop
√Master Cmd Status - Complete
√Cmd Code (four) - Stop
√Cmd Status (four) - Complete

7. ACQUIRE BOLTS

Node 1 Zenith CBM Mate

sel Acquire Bolts

Node 1 CBM Acquire Bolts

cmd ABolts Nominal
√Confirmation Request - ABolts

cmd Confirm Cmd
Wait 7 minutes.
√Master Cmd Status - Complete
√Cmd Code (sixteen) - ABolts
√Cmd Status (sixteen) - Complete
√Load (sixteen): 0 --- 6700

DAP: AUTO

8. PERFORM INTERMEDIATE TORQUING FIRST STAGE

Node 1 Zenith CBM Mate

sel First Stage

Node 1 CBM Intermediate Torque First Stage

cmd IBolt First Stage
√Confirmation Request - IBolt

cmd Confirm Cmd
Wait 2 minutes.
√Master Cmd Status - Complete
√Cmd Code (sixteen) - IBolt
√Cmd Status (sixteen) - Complete
√Load (sixteen): 0 --- 11150

9. PERFORM INTERMEDIATE TORQUING SECOND STAGE

Node 1 Zenith CBM Mate

sel Second Stage

Node 1 CBM Intermediate Torque Second Stage

cmd IBolt Second Stage
√Confirmation Request - IBolt

cmd Confirm Cmd
Wait 2 minutes.
√Master Cmd Status - Complete
√Cmd Code (sixteen) - IBolt
√Cmd Status (sixteen) - Complete
√Load (sixteen): 0 --- 15600

10. PERFORM INTERMEDIATE TORQUING THIRD STAGE

Node 1 Zenith CBM Mate

sel Third Stage

Node 1 CBM Intermediate Torque Third Stage

cmd IBolt Third Stage
√Confirmation Request - IBolt

cmd Confirm Cmd
Wait 2 minutes.
√Master Cmd Status - Complete
√Cmd Code (sixteen) - IBolt
√Cmd Status (sixteen) - Complete
√Load (sixteen): 0 --- 20050

11. PERFORM INTERMEDIATE TORQUING FOURTH STAGE

NOTE
Following Fourth Stage of the intermediate torque sequence, all 16 bolts should have preload in the range of 23400 --- 24500 N. Otherwise, step 11 should be repeated until all 16 bolts achieve the specified preload.

Node 1 Zenith CBM Mate

sel Fourth Stage

Node 1 CBM Intermediate Torque Fourth Stage

cmd IBolt Fourth Stage
√Confirmation Request - IBolt

cmd Confirm Cmd
Wait 2 minutes.
√Master Cmd Status - Complete
√Cmd Code (sixteen) - IBolt
√Cmd Status (sixteen) - Complete
√Load (sixteen): 23400 --- 24500 else repeat step 11

12. PERFORM INTERMEDIATE TORQUING LAST STAGE

NOTE
Following Last Stage of the intermediate torque sequence, all 16 bolts should have preload in the range of 45650 --- 46750 N. Otherwise, step 12 should be repeated until all 16 bolts achieve the specified preload.

Node 1 Zenith CBM Mate

sel Last Stage

Node 1 CBM Intermediate Torque Last Stage

cmd IBolt Last Stage
√Confirmation Request - IBolt

cmd Confirm Cmd
Wait 2 minutes.
√Master Cmd Status - Complete
√Cmd Code (sixteen) - IBolt
√Cmd Status (sixteen) - Complete
√Load (sixteen): 45650 --- 46750 else repeat step 12

13. PERFORM FINAL TORQUING SEQUENCE

NOTE
Following the final torque sequence, all 16 bolts should have preload in the range of 84800 --- 85900 N. Otherwise, step 13 should be repeated until all 16 bolts achieve the specified preload.

Node 1 Zenith CBM Mate

sel Final Torque

Node 1 CBM Final Torque

cmd FBolt Nominal
√Confirmation Request - FBolt

cmd Confirm Cmd
Wait 2 minutes.
√Master Cmd Status - Complete
√Cmd Code (sixteen) - FBolt
√Cmd Status (sixteen) - Complete
√Load (sixteen): 84800 --- 85900 else repeat step 13

14. CLOSE CAPTURE LATCHES

Node 1 Zenith CBM Mate

sel Close Capture Latches

Node 1 CBM Close Capture Latches

cmd Close
Wait 10 seconds.
√Confirmation Request - Close

cmd Confirm Cmd
√Master Cmd Status - Complete
√Cmd Code (four) - Close
√Cmd Status (four) - Complete
√Posn (four): 0 --- 1

15. DEACTIVATE ZENITH CBM MASTER CONTROLLER

Node 1 Zenith CBM Mate

sel Deactivate Zenith CBM

Node 1 Zenith CBM Deactivate CBM

cmd Deactivate
Mode - Deactivated
Master - None

16. OPEN SECONDARY RPCs

Node 1 Zenith CBM Mate

sel RPC 03

RPCM N14B B RPC 03

cmd Open **Execute**
√Position - Open

Node 1 Zenith CBM Mate

sel RPC 04

RPCM N14B B RPC 04

cmd Open **Execute**
√Position - Open

Node 1 Zenith CBM Mate

sel RPC 05

RPCM N14B B RPC 05

cmd Open **Execute**
√Position - Open

Node 1 Zenith CBM Mate

sel RPC 06

RPCM N14B B RPC 06

cmd Open **Execute**
√Position - Open

CBM PREP FOR MATE NODE 1 NADIR

OBJECTIVE:
Activate and check out Node 1 Nadir Active Common Berthing Mechanism (ACBM) and deploy capture latches.

LOCATION:
NOD1/AFD PCS

DURATION:
TBD

REFERENCED PROCEDURE(S):
None

1. VERIFY APCU POWER ON

TBD √APCU 1,2 CONVERTER TBD - gray
√APCU 1,2 OUTPUT TBD - gray

NOTE
CBM RT FDIR is disabled during CBM operations to prevent switching between 1553 bus channels due to a CBM RT failure.

2. INHIBIT NADIR CBM PRIMARY RT FDIR

PCS Node 1: CDH
Node 1: C&DH

sel N1-1

Secondary NCS MDM Node 1

sel UB ORB N1 1
sel RT Status

UB Orb RT Status

sel Inhib FDIR RT Commands

N1 1 MDM UB ORB N1 1 Inhib FDIR

cmd Inhib FDIR CBM N1 Nad Prim **Execute**

UB Orb RT Status

√RT FDIR Inhibited Number 17 - X

3. INHIBIT NADIR CBM SECONDARY RT FDIR

PCS Node 1: CDH

Node 1: C&DH

sel N1-2

Primary NCS MDM Node 1

sel UB ORB N1 2
sel RT Status

UB Orb RT Status

sel Inhib FDIR RT Commands

N1 2 MDM UB ORB N1 2 Inhib FDIR

cmd Inhib FDIR CBM N1 Nad Sec **Execute**

UB Orb RT Status

√RT FDIR Inhibited Number 17 - X

4. CLOSE PRIMARY RPCs

PCS Node 1: S&M: Nadir CBM

Node 1 Nadir CBM Display

'Command Sets'

sel Prep for Mate

Node 1 Nadir CBM Prep for Mate

sel RPC 03

RPCM N13B B RPC 03

cmd Close **Execute**
√Position - Close

Node 1 Nadir CBM Prep for Mate

sel RPC 04

RPCM N13B B RPC 04

cmd Close **Execute**
√Position - Close

Node 1 Nadir CBM Prep for Mate

sel RPC 05

RPCM N13B B RPC 05

cmd Close **Execute**
√Position - Close

Node 1 Nadir CBM Prep for Mate

sel RPC 06

RPCM N13B B RPC 06

cmd Close **Execute**
√Position - Close

5. ACTIVATE NADIR CBM PRIMARY MASTER CONTROLLER

Node 1 Nadir CBM Prep for Mate

sel Activate Primary Master

Node 1 Nadir CBM Act Pri Master

cmd Activate Primary
√Mode - Activated
√Master - Primary
√Master Cmd Status - Complete
√Comm Error - No X

sel Built-In Test Failures

Node 1 Active CBM Built In Test Failures

√No Xs

6. SET CONTROLLER POSITIONS ZERO

NOTE
Command should be issued to use currently active RS-485 bus channel (A or B.) Active channel is indicated in “485 Channel” telemetry field.

Node 1 Nadir CBM Prep for Mate

sel Initialize Controller Positions

Node 1 CBM Initialize Controller Positions

cmd Set All Positions to Zero Bus "X"
√Master Cmd Status - Complete

cmd Built-In Test
√Confirmation Request - Built-In Test

cmd Confirm Cmd
√Master Cmd Status - Complete
√Bolt Cmd Code (sixteen) - Built-In Test
√Latch Cmd Code (four) - Built-In Test
√Bolt Cmd Status (sixteen) - Complete
√Latch Cmd Status (four) - Complete
√Bolt Posn (sixteen): 0
√Latch Posn (four): 0

sel Built-In Test Failures

Node 1 Active CBM Built In Test Failures

√No Xs

7. TEST BOLT DRIVE

Node 1 Nadir CBM Prep for Mate

sel Berthing Bolt Check

Node 1 CBM Berthing Bolt Check

cmd Bboltck
Wait 90 seconds.
√Master Cmd Status - Complete
√Bolt Cmd Code (sixteen) - BBoltck
√Bolt Cmd Status (sixteen) - Complete
√Bolt Pos (sixteen): 0 --- 51

NOTE
Steps (8 --- 16) verify secondary power/ command path and deploy capture latches.

8. DEACTIVATE NADIR CBM PRIMARY MASTER CONTROLLER

Node 1 Nadir CBM Prep for Mate

sel Deactivate Nadir CBM

Node 1 Nadir CBM Deactivate CBM

cmd Deactivate
Mode - Deactivated
Master - None

9. CLOSE SECONDARY RPCs

Node 1 Nadir CBM Prep for Mate

sel RPC 11

RPCM N14B B RPC 11

cmd Close **Execute**
√Position - Close

Node 1 Nadir CBM Prep for Mate

sel RPC 12

RPCM N14B B RPC 12

cmd Close **Execute**
√Position - Close

Node 1 Nadir CBM Prep for Mate

sel RPC 13

RPCM N14B B RPC 13

cmd Close **Execute**
√Position - Close

Node 1 Nadir CBM Prep for Mate

sel RPC 14

RPCM N14B B RPC 14

cmd Close **Execute**
√Position - Close

10. OPEN PRIMARY RPCs

Node 1 Nadir CBM Prep for Mate

sel RPC 03

RPCM N13B B RPC 03

cmd Open **Execute**
√Position - Open

Node 1 Nadir CBM Prep for Mate

sel RPC 04

RPCM N13B B RPC 04

cmd Open **Execute**
√Position - Open

Node 1 Nadir CBM Prep for Mate

sel RPC 05

RPCM N13B B RPC 05

cmd Open **Execute**
√Position - Open

Node 1 Nadir CBM Prep for Mate

sel RPC 06

RPCM N13B B RPC 06

cmd Open **Execute**
√Position - Open

11. ACTIVATE NADIR CBM SECONDARY MASTER CONTROLLER

Node 1 Nadir CBM Prep for Mate

sel Activate Secondary Master

Node 1 Nadir CBM Act Sec Master

cmd Activate Secondary
√Mode - Activated
√Master - Secondary

√Master Cmd Status - Complete
√Comm Error - No X

sel Built In Test Failures

Node 1 Active CBM Built In Test Failures

√No Xs

12. SET CONTROLLER POSITIONS ZERO

NOTE
Command should be issued to use currently active RS-485 bus channel (A or B). Active channel is indicated in “485 Channel” telemetry field.

Node 1 Nadir CBM Prep for Mate

sel Initialize Controller Positions

Node 1 CBM Initialize Controller Positions

cmd Set All Positions to Zero Bus “X”
√Master Cmd Status - Complete

cmd Built-In Test
√Confirmation Request - Built-In Test

cmd Confirm Cmd
√Master Cmd Status - Complete
√Bolt Cmd Code (sixteen) - Built-In Test
√Latch Cmd Code (four) - Built-In Test
√Bolt Cmd Status (sixteen) - Complete
√Latch Cmd Status (four) - Complete
√Bolt Posn (sixteen) = 0
√Latch Posn (four) = 0

sel Built-In Test Failures

Node 1 Active CBM Built In Test Failures

√No Xs

13. CLOSE CAPTURE LATCHES

Node 1 Nadir CBM Prep for Mate

sel Close Capture Latches

Node 1 CBM Close Capture Latches

cmd Close
Wait 10 seconds.
√Confirmation Request - Close

cmd Confirm Cmd
√Master Cmd Status - Complete
√Cmd Code (four) - Close
√Cmd Status (four) - Complete
√Posn (four): 0 --- 1

14. SET LATCH ANGLES ZERO

NOTE
Command should be issued to use currently active RS-485 bus channel (A or B). Active channel is indicated in "485 Channel" telemetry field.

Node 1 Nadir CBM Prep for Mate

sel Set Latch Angles to Zero

Node 1 CBM Set Latch Angles to Zero

cmd Set Latch Angles to Zero Bus "X"
√Master Cmd Status - Complete
√Cmd Code (four) - Reload
√Cmd Status (four) - Complete
√Posn (four) = 0

15. DEPLOY CAPTURE LATCHES

Node 1 Nadir CBM Prep for Mate

sel Deploy Capture Latches

Node 1 CBM Deploy Capture Latches

cmd Deploy Nominal
Wait 80 seconds.
√Master Cmd Status - Complete
√Latch Cmd Code (four) - Close
√Latch Cmd Status (four) - Complete
√Latch Posn (four): 199 --- 200

16. CLOSE PRIMARY RPCs

Node 1 Nadir CBM Prep for Mate

sel RPC 03

RPCM N13B B RPC 03

cmd Close Execute
√Position - Close

Node 1 Nadir CBM Prep for Mate

sel RPC 04

RPCM N13B B RPC 04

cmd Close **Execute**
√Position - Close

Node 1 Nadir CBM Prep for Mate

sel RPC 05

RPCM N13B B RPC 05

cmd Close **Execute**
√Position - Close

Node 1 Nadir CBM Prep for Mate

sel RPC 06

RPCM N13B B RPC 06

cmd Close **Execute**
√Position - Close

CBM PREP FOR MATE NODE 1 ZENITH

OBJECTIVE:
Activate and check out Node 1 Zenith Active Common Berthing Mechanism (ACBM) and deploy capture latches.

LOCATION:
NOD1/AFD PCS

DURATION:
TBD

REFERENCED PROCEDURE(S):
P/TVxx NODE 1 ZENITH CBM SURVEY (PHOTO/TV CHECKLIST)

1. VERIFY POWER AND DATA CONFIGURATION

SSP1
√APCU 1,2 CONV tb (two) - Gray
√APCU 1,2 OUTPUT tb - Gray

CRT
SM 200 APCU Status

√APCU 1,2 OUT VOLTS LOW (RES) (two) > 122

PCS
Node 1: CDH
Node 1: C&DH

√MDM N1-2 - Primary
√MDM N1-1 - Secondary

2. INHIBIT ZENITH CBM PRIMARY RT FDIR

NOTE
CBM RT FDIR is disabled during CBM operations to prevent switching between 1553 bus channels due to a CBM RT failure.

PCS
Node 1: CDH
Node 1: C&DH

sel N1-1

Secondary NCS MDM Node 1

sel UB ORB N1 1
sel RT Status

UB Orb RT Status

sel Inhib FDIR RT Commands

N1 1 MDM UB ORB N1 1 Inhib FDIR

cmd Inhib FDIR CBM N1 Zen Prim **Execute**

UB Orb RT Status

√RT FDIR Inhibited Number 20 - X

3. INHIBIT ZENITH CBM SECONDARY RT FDIR

PCS Node 1: CDH
Node 1: C&DH

sel N1-2

Primary NCS MDM Node 1

sel UB ORB N1 2
sel RT Status

UB Orb RT Status

sel Inhib FDIR RT Commands

N1 2 MDM UB ORB N1 2 Inhib FDIR

cmd Inhib FDIR CBM N1 Zen Sec **Execute**

UB Orb RT Status

√RT FDIR Inhibited Number 20 - X

4. CLOSE PRIMARY RPCs

PCS Node 1: S&M: Zenith CBM
Node 1 Zenith CBM Display
'Command Sets'

sel Prep for Mate

Node 1 Zenith CBM Prep for Mate

sel RPC 11

RPCM N13B B RPC 11

cmd Close **Execute**
√Position - Close

Node 1 Zenith CBM Prep for Mate

sel RPC 12

RPCM N13B B RPC 12

cmd Close **Execute**
√Position - Close

Node 1 Zenith CBM Prep for Mate

sel RPC 13

RPCM N13B B RPC 13

cmd Close **Execute**
√Position - Close

Node 1 Zenith CBM Prep for Mate

sel RPC 14

RPCM N13B B RPC 14

cmd Close **Execute**
√Position - Close

5. ACTIVATE ZENITH CBM PRIMARY MASTER CONTROLLER

Node 1 Zenith CBM Prep for Mate

sel Activate Primary Master

Node 1 Zenith CBM Act Pri Master

cmd Activate Primary
√Mode - Activated
√Master - Primary
√Master Cmd Status - Complete
√Comm Error - No X

sel Built-In Test Failures

Node 1 Active CBM Built In Test Failures

√No Xs

6. SET CONTROLLER POSITIONS ZERO

NOTE
Command should be issued to use currently active RS-485 bus channel (A or B). Active channel is indicated in “485 Channel” telemetry field.

Node 1 Zenith CBM Prep for Mate

sel Initialize Controller Positions

Node 1 CBM Initialize Controller Positions

cmd Set All Positions to Zero Bus “X”
√Master Cmd Status - Complete
√Bolt Cmd Status (sixteen) - Complete
√Latch Cmd Status (four) - Complete
If any Bolt or Latch Cmd Status - No Broadcast
cmd Built-In Test
√Confirmation Request - Built-In Test
√Master Cmd Status - Complete
√Bolt Cmd Code (sixteen) - Built-In Test
√Latch Cmd Code (four) - Built-In Test
√Bolt Cmd Status (sixteen) - Complete
√Latch Cmd Status (four) - Complete

sel Built-In Test Failures

Node 1 Active CBM Built In Test Failures

√No Xs

Node 1 CBM Initialize Controller Positions

√Bolt Posn (sixteen) = 0
√Latch Posn (four) = 0
If any Bolt or Latch Posn ≠ 0
cmd Set All Positions to Zero Bus “X”
√Master Cmd Status - Complete
√Bolt Cmd Code (sixteen) - Reload
√Latch Cmd Code (four) - Reload
√Bolt Cmd Status (sixteen) - Complete
√Latch Cmd Status (four) - Complete
√Bolt Posn (sixteen) = 0
√Latch Posn (four) = 0

7. TEST BOLT DRIVE

Node 1 Zenith CBM Prep for Mate

sel Berthing Bolt Check

Node 1 CBM Berthing Bolt Check

cmd Bboltck
Wait 90 seconds.
√Master Cmd Status - Complete
√Bolt Cmd Code (sixteen) - BBoltck
√Bolt Cmd Status (sixteen) - Complete
√Bolt Pos (sixteen): 50 --- 51

8. DEACTIVATE ZENITH CBM PRIMARY MASTER CONTROLLER

NOTE
Steps (8 --- 16) verify secondary power/ command path and deploy capture latches.

Node 1 Zenith CBM Prep for Mate

sel Deactivate Zenith CBM

Node 1 Zenith CBM Deactivate CBM

cmd Deactivate
√Mode - Deactivated
√Master - None

9. OPEN PRIMARY RPCs

Node 1 Zenith CBM Prep for Mate

sel RPC 11

RPCM N13B B RPC 11

cmd Open **Execute**
√Position - Open

Node 1 Zenith CBM Prep for Mate

sel RPC 12

RPCM N13B B RPC 12

cmd Open **Execute**
√Position - Open

Node 1 Zenith CBM Prep for Mate

sel RPC 13

RPCM N13B B RPC 13

cmd Open **Execute**
√Position - Open

Node 1 Zenith CBM Prep for Mate

sel RPC 14

RPCM N13B B RPC 14

cmd Open **Execute**
√Position - Open

10. CLOSE SECONDARY RPCs

Node 1 Zenith CBM Prep for Mate

sel RPC 03

RPCM N14B B RPC 03

cmd Close **Execute**
√Position - Close

Node 1 Zenith CBM Prep for Mate

sel RPC 04

RPCM N14B B RPC 04

cmd Close **Execute**
√Position - Close

Node 1 Zenith CBM Prep for Mate

sel RPC 05

RPCM N14B B RPC 05

cmd Close **Execute**
√Position - Close

Node 1 Zenith CBM Prep for Mate

sel RPC 06

RPCM N14B B RPC 06

cmd Close **Execute**
√Position - Close

11. ACTIVATE ZENITH CBM SECONDARY MASTER CONTROLLER

Node 1 Zenith CBM Prep for Mate

sel Activate Secondary Master

Node 1 Zenith CBM Act Sec Master

cmd Activate Secondary
√Mode - Activated
√Master - Secondary
√Master Cmd Status - Complete
√Comm Error - No X

sel Built In Test Failures

Node 1 Active CBM Built In Test Failures

√No Xs

12. SET CONTROLLER POSITIONS ZERO

NOTE
Command should be issued to use currently active RS-485 bus channel (A or B). Active channel is indicated in "485 Channel" telemetry field.

Node 1 Zenith CBM Prep for Mate

sel Initialize Controller Positions

Node 1 CBM Initialize Controller Positions

cmd Set All Positions to Zero Bus "X"
√Master Cmd Status - Complete

cmd Built-In Test
√Confirmation Request - Built-In Test

cmd Confirm Cmd
√Master Cmd Status - Complete
√Bolt Cmd Code (sixteen) - Built-In Test
√Latch Cmd Code (four) - Built-In Test
√Bolt Cmd Status (sixteen) - Complete
√Latch Cmd Status (four) - Complete
If any Bolt or Latch Cmd Status - No Broadcast
cmd Built-In Test
√Confirmation Request - Built-In Test
cmd Confirm Cmd
√Master Cmd Status - Complete
√Bolt Cmd Code (sixteen) - Built-In Test
√Latch Cmd Code (four) - Built-In Test
√Bolt Cmd Status (sixteen) - Complete
√Latch Cmd Status (four) - Complete

sel Built-In Test Failures

Node 1 Active CBM Built In Test Failures

√No Xs

Node 1 CBM Initialize Controller Positions

√Bolt Posn (sixteen) = 0
√Latch Posn (four) = 0
If any Bolt or Latch Posn ≠ 0
cmd Set All Positions to Zero Bus "X"
√Master Cmd Status - Complete
√Bolt Cmd Code (sixteen) - Reload
√Latch Cmd Code (four) - Reload
√Bolt Cmd Status (sixteen) - Complete
√Latch Cmd Status (four) - Complete
√Bolt Posn (sixteen) = 0
√Latch Posn (four) = 0

13. DEPLOY LATCH 1 TO 210 DEGREES

Node 1 Zenith CBM Prep for Mate

sel Deploy Latch 1

Node 1 CBM Deploy Latch 1 to 210

cmd Deploy Latch 1 to 210
Wait 90 seconds.
√Confirmation Request - Deploy

cmd Confirm Cmd
√Master Cmd Status - Fail
√Cmd Code - Deploy
√Cmd Status - Binding
√Posn: 200 --- 210

cmd Stop
√Master Cmd Status - Complete
√Cmd Code - Stop
√Cmd Status - Complete

14. DEPLOY LATCH 2 TO 210 DEGREES

Node 1 Zenith CBM Prep for Mate

sel Deploy Latch 2

Node 1 CBM Deploy Latch 2 to 210

cmd Deploy Latch 2 to 210
Wait 90 seconds.
√Confirmation Request - Deploy

cmd Confirm Cmd
√Master Cmd Status - Fail
√Cmd Code - Deploy
√Cmd Status - Binding
√Posn: 200 --- 210

cmd Stop
√Master Cmd Status - Complete
√Cmd Code - Stop
√Cmd Status - Complete

15. DEPLOY LATCH 3 TO 210 DEGREES

Node 1 Zenith CBM Prep for Mate

sel Deploy Latch 3

Node 1 CBM Deploy Latch 3 to 210

cmd Deploy Latch 3 to 210
Wait 90 seconds.
√Confirmation Request - Deploy

cmd Confirm Cmd
√Master Cmd Status - Fail
√Cmd Code - Deploy
√Cmd Status - Binding
√Posn: 200 --- 210

cmd Stop
√Master Cmd Status - Complete
√Cmd Code - Stop
√Cmd Status - Complete

16. DEPLOY LATCH 4 TO 210 DEGREES

Node 1 Zenith CBM Prep for Mate

sel Deploy Latch 4

Node 1 CBM Deploy Latch 4 to 210

cmd Deploy Latch 4 to 210
Wait 90 seconds.
√Confirmation Request - Deploy

cmd Confirm Cmd
√Master Cmd Status - Fail
√Cmd Code - Deploy
√Cmd Status - Binding
√Posn: 200 --- 210

cmd Stop
√Master Cmd Status - Complete
√Cmd Code - Stop
√Cmd Status - Complete

17. SET BOLT/LATCH START POSITIONS

NOTE
Command should be issued to use currently active RS-485 bus channel (A or B). Active channel is indicated in “485 Channel” telemetry field.

Node 1 Zenith CBM Prep for Mate

sel Set Bolt/Latch Start Positions

Node 1 CBM Set Bolt/Latch Start Positions

cmd Set Mate Start Positions Bus “X”
√Master Cmd Status - Complete
√Bolt Cmd Code (sixteen) - Reload
√Latch Cmd Code (four) - Reload
√Bolt Cmd Status (sixteen) - Complete
√Latch Cmd Status (four) - Complete
√Bolt Posn (sixteen) = 0
√Latch Posn (four) = 205

18. VERIFY PETAL COVER DEPLOYMENT
√P/TVxx NODE 1 ZENITH CBM SURVEY complete (Photo/TV Checklist)

VESTIBULE OUTFITTING NODE 1 TO Z1 TRUSS

OBJECTIVE:
To remove CBM hardware and install utility jumpers essential to Flight 3A operations.

LOCATION:
Installed: N1, Z1 Vestibule
Stowed: √Maintenance Database

DURATION:
TBD

PARTS:
Vestibule Outfitting Kit (VOK):
1 Cap Set:
    4 EPS Power Connector Cap TBD
2 Ground Straps 683-13477-7

MATERIALS:
None

TOOLS REQUIRED:
Equipment Bag
Kit A:
    1/2” Combination Wrench
    6” Adjustable Wrench
Kit C:
    TBD Socket
Kit E:
    Ratchet, 3/8” Drive

REFERENCED PROCEDURE(S):
None

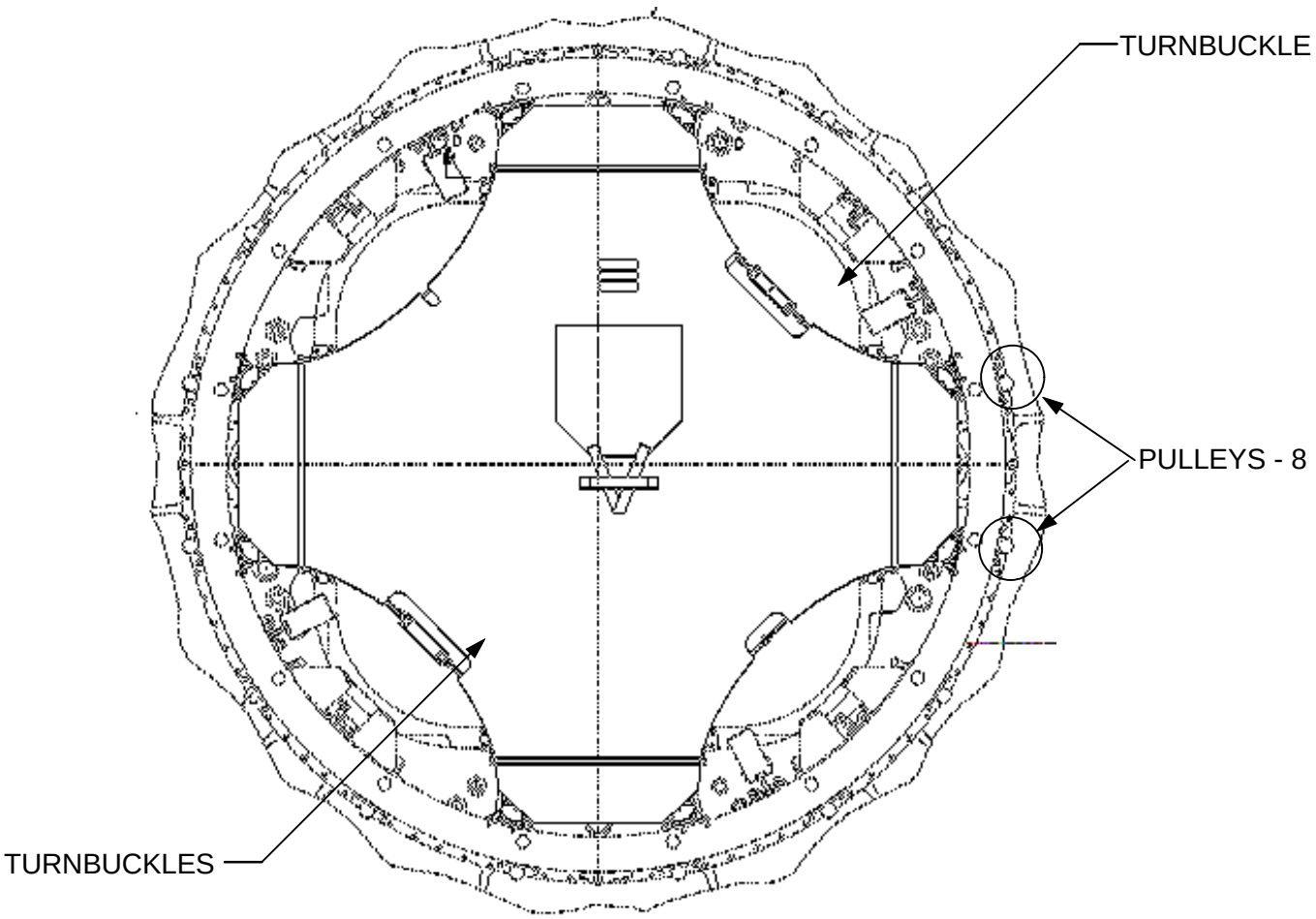

Figure 1.- Meteor Debris Thermal Cover - View Looking From Passive To Active CBM.

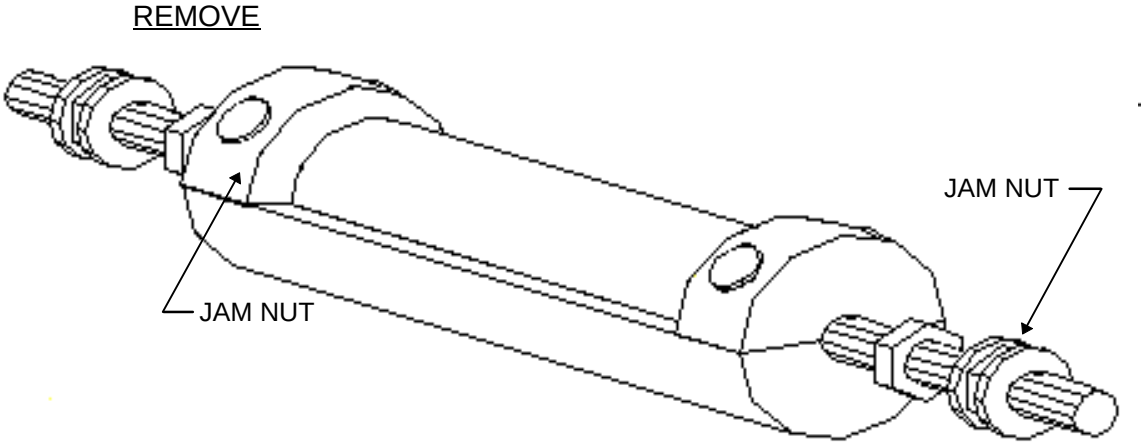

Figure 2.- Turnbuckle.

1. Loosen Jam Nuts (two) at ends of Turnbuckles (1/2” Combination Wrench, 6” Adjustable Wrench).
   See Figures 1 and 2.

2. Unscrew Turnbuckles (two), release tension on pulleys (approximately 72 turns produces a hard stop).

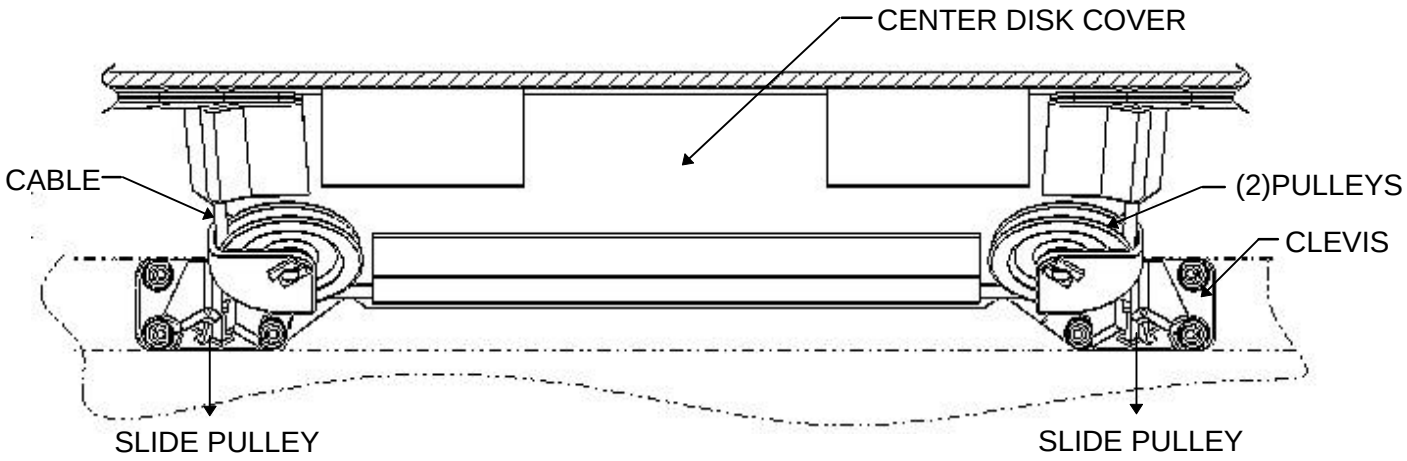

Figure 3.- Pulley, Cable, and Clevis - View Looking From Center Of Center Disk.

NOTE
Recommend removing pulleys and standoff bars by quadrants.

3. Remove pulley from Clevis by pushing towards ACBM ring and sliding from Clevis.
   See Figure 3.

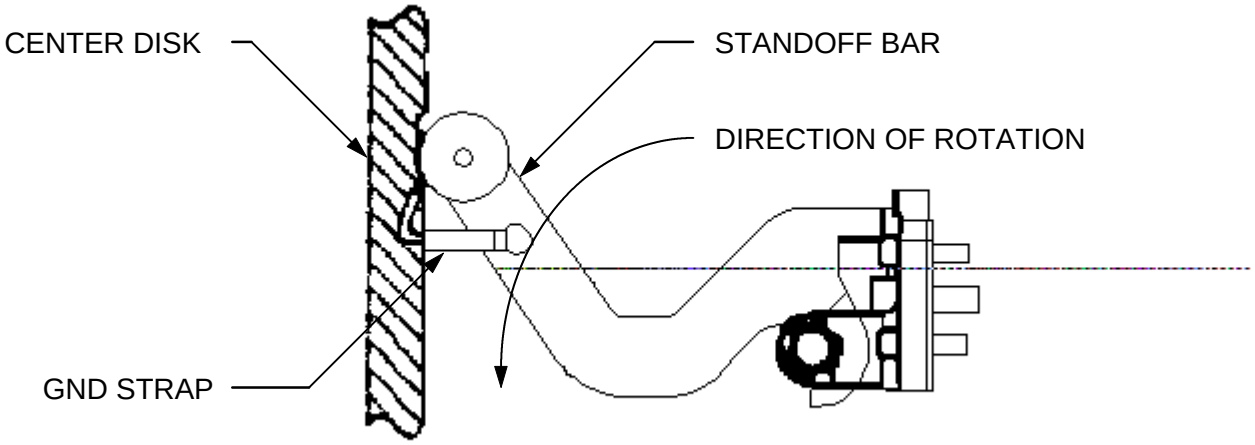

Figure 4.- Side view of Standoff Bar.

4. Remove Ground Strap (Ratchet 3/8", TBD Socket).
   See Figure 4.

5. Rotate standoff bar towards hatch center, remove from structure. Tmpry stow.
   See Figure 4.

6. Repeat steps 1 through 6 for remaining quadrants (three).

7. Fold cover.
   Tmpry stow.

INSTALL UTILITIES

8. Attach Ground Straps (two) across vestibule interface 180 degrees apart Zenith and Nadir sides of radial port (Tools TBD) (Fasteners two per strap).

EPS

9. Install Z1 Heater Wire Harnesses (W60 and W61) between Node 1 Zenith Bulkhead (J72 and J60) and Z1 Truss Bulkhead (P172 and P160) respectively.
   Tmpry stow all protective caps.
   P172 →|← J72, P160 →|← J60.

10. CLOSE Z1 DOME HEATER RPC

PCS Node 1: EPS

Node 1:EPS

sel RPCM N14B B

RPCM N14B B

cmd RPC 3 - Close

√RPC 3 - Cl

NOTE
The installation of the clevis/pulley sets, standoff bars is done with respect to quadrants.

REPLACE THERMAL COVER

11. Remove cover from stowage. Slide cover in place past the ACBM motor controllers before unfolding it for installation.

12. Unfold top flap from center towards controller.

13. Grasp standoff bar with both hands, place hooks under bracket restraints.

14. Rotate standoff bar approximately 45 degrees away from controller using both hands to assure both hooks rotate evenly into place.
    See Figure 4.

15. Insert pulley, align T-shaped base of pulley stem with slot in clevis, slide pulley in an axial motion relative to active ring until pulley snaps into place. Repeat for additional pulley on quadrant.

NOTE

The nut located outside of the jam nut, the hex section of the cable terminal, indicates which way the threads run. The cable terminal with holes drilled in it indicates that all nuts on that side have left hand threads.

16. Restore tension to center disk, grasp turnbuckle and twist until it stops while holding tension on Cable Terminal Hex Section (1/2” Combination Wrench).

17. Tighten Jam Nuts (two) at ends of Turnbuckles (1/2” Combination Wrench, 6” Adjustable Wrench).
See Figures 1 and 2.

18. Replace Ground Strap on Standoff Bar (Ratchet 3/8", TBD Socket).
See Figure 4.

19. Repeat steps 12 through 17 for additional quadrants (three).

20. Stow tools, equipment.

TCS PROCEDURES

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NODE 1/PMA 1 PRE-INGRESS HEATER RECONFIGURATION

1. VERIFY PMA 1 AND NODE 1 A HEATERS INHIBITED

PCS Node 1: TCS

NODE1: TCS

√PMA 1 Htr A Availbty (four) - Inh
√Node 1 Htr A Availbty (nine) - Inh

2. INHIBIT PMA1 AND NODE 1 B HEATERS

NOTE
PMA 1 Heater 4B is not active and does not appear on the PCS NODE 1 TCS Display.

sel PMA1 Htr (Node 1 Htr 1 --- 6) (Node 1 Htr 7 --- 9) Availability

PMA1 Htr (Node1 Htr 1-6) (Node 1 Htr 7-9) Availability

sel PMA 1(Node 1) Htr[X(Y)]B - Inhibit [X] = 1 2 3 5
[Y] = 1 2 3 4 5 6 7 8 9

√PMA 1(Node 1) Htr[X(Y)]B Availability - Inh

Repeat

3. MODIFY SETPOINTS FOR ALL PMA 1 HEATER TEMP SENSORS

> NOTE
> PMA 1 Heaters 2A and 4B are not active and do not appear on the PCS NODE 1 TCS Display.

sel PMA1 HtrA(B) setpoints

PMA1 HtrA(B) setpts

sel PMA 1 Htr[X(Y)]A(B) Change Setpoints [X] = 1 3 4 5
[Y] = 1 2 3 5

> NOTE
> Specific values to be entered in the template command below for each PMA 1 temperature sensor are provided in Table 1 - PMA 1/Node 1 Heater Configuration Table. Values are provided for each of the five items in the template: Upper Setpoint, Failure Upper Limit, Lower Setpoint, Failure Lower Limit, and Cyclic Load Delta.

sel Upper Setpoint
Failure Upper Limit
Lower Setpoint
Failure Lower Limit
Cyclic Load Delta
Setpt Change **Execute**

√PMA1 Htr[X(Y)]A(B) Upper Setpoint
√Failure Upper Limit
√Lower Setpoint
√Failure Lower Limit
√Cyclic Load Delta

Repeat

4. MODIFY SETPOINTS FOR ALL NODE 1 HEATER TEMP SENSORS
sel Node 1 Htr A(B) setpoints

Node1 Htr A(B) setpoints

sel **cmd** Htr [X]A,B chng setpoint

[X] = 1 2 3 4 5 6 7 8 9

NOTE

Specific values to be entered in the template command below for each Node 1 temperature sensor are provided in Table 1. Values are provided for each of the five items in the template: Upper Setpoint, Failure Upper Limit, Lower Setpoint, Failure Lower Limit, and Cyclic Load Delta.

sel Upper Setpoint
Failure Upper Limit
Lower Setpoint
Failure Lower Limit
Cyclic Load Delta
Setpt Change **Execute**

NOTE

As depicted on the PCS NODE 1 TCS display, ten of the eighteen Node 1 heaters have two temperature sensors (Heaters 1A, 1B, 3A, 3B, 5A, 5B, 6A, 6B, 7A, and 7B). For these heaters, setpoints for both temperature sensors must be changed. Values for both sensors are provided in Table 1.

√Nod1 Htr[X]A,B Upper Setpoint
√Failure Upper Limit
√Lower Setpoint
√Failure Lower Limit
√Cyclic Load Delta

Repeat

TABLE 1 - PMA1/NODE 1 HEATER CONFIGURATION
PRE-INGRESS HEATER RECONFIG

PMA 1 HEATERS (ALL TEMPS IN °C)

HEATER	AVAIL-ABILITY	UPPER SETPOINT	FAILURE UPPER LIMIT	LOWER SETPOINT	FAILURE LOWER LIMIT	CYCLIC LOAD DELTA
1A	Inh	21	45	18	-18	0
1B	Inh	21	45	18	-18	0
2B	Inh	21	45	18	-18	0
3A	Inh	21	45	18	-18	0
3B	Inh	21	45	18	-18	0
4A	Inh	21	45	18	-18	0
5A	Inh	21	45	18	-18	0
5B	Inh	21	45	18	-18	0

NODE 1 HEATERS(ALL TEMPS IN °C)

HEATER (SENSOR)	AVAIL-ABILITY	UPPER SETPOINT	FAILURE UPPER LIMIT	LOWER SETPOINT	FAILURE LOWER LIMIT	CYCLIC LOAD DELTA
1A (Snsr 1)	Inh	21	45	18	-18	0
1A (Snsr 2)		21	45	18	-18	0
1B (Snsr 1)	Inh	21	45	18	-18	0
1B (Snsr 2)		21	45	18	-18	0
2A	Inh	21	45	18	-18	0
2B	Inh	21	45	18	-18	0
3A (Snsr 1)	Inh	21	45	18	-18	0
3A (Snsr 2)		21	45	18	-18	0
3B (Snsr 1)	Inh	21	45	18	-18	0
3B (Snsr 2)		21	45	18	-18	0
4A	Inh	21	45	18	-18	0
4B	Inh	21	45	18	-18	0
5A (Snsr 1)	Inh	21	45	18	-18	0
5A (Snsr 2)		21	45	18	-18	0
5B (Snsr 1)	Inh	21	45	18	-18	0
5B (Snsr 2)		21	45	18	-18	0
6A (Snsr 1)	Inh	21	45	18	-18	0
6A (Snsr 2)		21	45	18	-18	0
6B (Snsr 1)	Inh	21	45	18	-18	0
6B (Snsr 2)		21	45	18	-18	0
7A(Snsr 1)	Inh	21	45	18	-18	0
7A (Snsr 2)		21	45	18	-18	0
7B (Snsr 1)	Inh	21	45	18	-18	0
7B (Snsr 2)		21	45	18	-18	0
8A	Inh	21	45	18	-18	0
8B	Inh	21	45	18	-18	0
9A	Inh	21	45	18	-18	0
9B	Inh	21	45	18	-18	0

3A NODE1/PMA1 SHELL WARM-UP

1. DOCUMENT HEATER POWER ALLOCATION FOR WARM UP

NOTE
The heater power allocation recorded in this step is the total power available to the US segment minus the current housekeeping power.

√**MCC** for heater power allocation

Record heater power allocation: _____ W

2. VERIFY PMA 1 AND NODE 1 HEATERS INHIBITED

NODE1: TCS

√PMA1 HtrA,B Availblty (eight) - Inh
√Nod1 HtrA,B Availblty (eighteen) - Inh

3. NODE 1/PMA 1 SHELL HEATER PRIORITIZATION

NOTE

1. Node 1 and PMA 1 heaters are reconfigured at four hour intervals based on Shell Temperature and heater power allocation. The coldest areas of the PMA 1 or Node 1 shell will be given the highest priority when heaters are enabled. Heater availability will be commanded to “Enabled to Operate” in priority order, starting with the PMA 1 or Node 1 heater control zone with the coldest temperature.

2. Rank Node 1 and PMA 1 Shell Heaters from coldest to warmest using the temperature sensor(s) associated with each heater.

3. Record the heater priority in Table TBD1.

4. In the priority order documented in Table TBD1, select a group of heaters that can be commanded to the “Enabled to Operate” state within the heater power allocation recorded in Step 1.

5. If a given heater will cause the total heater power to exceed the power allocation documented in Step 1 then that heater should be skipped and the next heater in priority order should be compared to the power allocation. All PMA 1 and Node 1 Shell Heaters should be evaluated in priority order.

Document in Table TBD2 the group of heaters to be enabled.

4. INHIBIT PMA 1 AND NODE 1 HEATERS NOT SELECTED FOR WARMUP

NOTE
This step inhibits Node 1 and PMA 1 Shell Heaters which were used in the previous four hours of the warm up but were not selected for the next four hour warm up period. When Step 4 is executed for the first time, all heaters will already be Inhibited.

If any PMA 1 (Node 1) Htr[X]A(B) not included in Table TBD2 is Ena Opr

sel PMA1 Htr (Node1 Htr 1 --- 6) (Node 1 Htr 7 --- 9) Availability

PMA1 Htr (Node1 Htr 1-6) (Node 1 Htr 7-9) Availability

sel PMA 1 (Node 1) Htr[X]A(B)

cmd PMA 1 (Node 1) Htr[X]A(B) - Inhibit
√PMA 1 (Nod1) Htr[X]A(B) Availability - Inh

Repeat

5. ENABLE PMA 1 AND NODE 1 HEATERS SELECTED FOR WARMUP

NOTE
This step Enables Node 1 and PMA 1 Shell Heaters which were not used in the previous four hours of the warm up but will be used in the next four hour warm up period. When Step 5 is executed for the first time, all heaters will already be Inhibited.

If any PMA 1 (Node 1) Htr[X]A(B) included in Table TBD2 is Inh

sel PMA 1 Htr (Node 1 Htr 1 --- 6) (Node 1 Htr 7 --- 9) Availability

PMA1 Htr (Node1 Htr 1-6) (Node 1 Htr 7-9) Availability

sel PMA 1 (Node 1) Htr[X]A(B)

cmd PMA 1 (Node 1) Htr[X]A(B) - Ena Operate
√PMA 1 (Nod1) Htr[X]A(B) Availability - Ena Opr

Repeat

Wait 4 hours and repeat steps 2 --- 5 until all Node 1 and PMA 1 shell temperatures are ≥ 18° C.

6. INHIBIT A HEATERS AND ENABLE TO OPERATE B HEATERS FOR NODE 1/PMA 1 SHELL TEMPERATURE MAINTENANCE

NOTE
Step 6 should be executed only after all PMA 1 and Node 1 shell temperatures are ≥ 18° C.

If any PMA 1 (Node 1) Htr[X]A not Inh

sel PMA 1 Htr (Node 1 Htr 1 --- 6) (Node 1 Htr 7 --- 9) Availability

PMA1 Htr (Node1 Htr 1-6) (Node 1 Htr 7-9) Availability

sel PMA 1 (Node 1) Htr[X]A(B)

cmd PMA 1 (Node 1) Htr[X]A(B) - Inhibit
√PMA 1 (Nod1) Htr[X]A(B) Availability - Inh

Repeat

If any PMA 1 (Node 1) Htr[X]A not Ena Opr

sel PMA 1 Htr (Node 1 Htr 1 --- 6) (Node 1 Htr 7 --- 9) Availability

PMA1 Htr (Node1 Htr 1-6) (Node 1 Htr 7-9) Availability

sel PMA 1 (Node 1) Htr[X]A(B)

cmd PMA 1 (Node 1) Htr[X]A(B) - Ena Operate
√PMA 1 (Node 1) Htr[X]A(B) Availability - Ena Opr

Repeat

NOTE
The final configuration for PMA 1 and Node 1 Heaters is provided in Table 3. The setpoints and failure limits for each temperature sensor are not changed in this procedure and are provided in Table 3 for reference only.

TABLE 3 - PMA 1/NODE 1 HEATER CONFIGURATION TABLE
NODE 1/PMA 1 WARM UP

PMA 1 HEATERS (ALL TEMPS IN °C)

HEATER	AVAIL-ABILITY	UPPER SETPOINT	FAILURE UPPER LIMIT	LOWER SETPOINT	FAILURE LOWER LIMIT	CYCLIC LOAD DELTA
1A	Inh	21	45	18	-18	0
1B	Ena Opr	21	45	18	-18	0
2B	Ena Opr	21	45	18	-18	0
3A	Inh	21	45	18	-18	0
3B	Ena Opr	21	45	18	-18	0
4A	Inh	21	45	18	-18	0
5A	Inh	21	45	18	-18	0
5B	Ena Opr	21	45	18	-18	0

NODE 1 HEATERS (ALL TEMPS IN °C)

HEATER (SENSOR)	AVAIL-ABILITY	UPPER SETPOINT	FAILURE UPPER LIMIT	LOWER SETPOINT	FAILURE LOWER LIMIT	CYCLIC LOAD DELTA
1A (Snsr 1)	Inh	21	45	18	-18	0
1A (Snsr 2)		21	45	18	-18	0
1B (Snsr 1)	Ena Opr	21	45	18	-18	0
1B (Snsr 2)		21	45	18	-18	0
2A	Inh	21	45	18	-18	0
2B	Ena Opr	21	45	18	-18	0
3A (Snsr 1)	Inh	21	45	18	-18	0
3A (Snsr 2)		21	45	18	-18	0
3B (Snsr 1)	Ena Opr	21	45	18	-18	0
3B (Snsr 2)		21	45	18	-18	0
4A	Inh	21	45	18	-18	0
4B	Ena Opr	21	45	18	-18	0
5A (Snsr 1)	Inh	21	45	18	-18	0
5A (Snsr 2)		21	45	18	-18	0
5B (Snsr 1)	Ena Opr	21	45	18	-18	0
5B (Snsr 2)		21	45	18	-18	0
6A (Snsr 1)	Inh	21	45	18	-18	0
6A (Snsr 2)		21	45	18	-18	0
6B (Snsr 1)	Ena Opr	21	45	18	-18	0
6B (Snsr 2)		21	45	18	-18	0
7A(Snsr 1)	Inh	21	45	18	-18	0
7A (Snsr 2)		21	45	18	-18	0
7B (Snsr 1)	Ena Opr	21	45	18	-18	0
7B (Snsr 2)		21	45	18	-18	0
8A	Inh	21	45	18	-18	0
8B	Ena Opr	21	45	18	-18	0
9A	Inh	21	45	18	-18	0
9B	Inh	21	45	18	-18	0

NODE 1/PMA 1 POST DRY-OUT HEATER RECONFIGURATION

1. VERIFY A HEATERS INHIBITED AND B HEATERS ENABLE TO OPERATE

PCS Node 1: TCS

NODE1: TCS

√PMA 1, Node 1 Htr A Availbty (thirteen) - Inh
√PMA 1, Node 1 Htr B Availbty (thirteen) - Ena Opr

2. INHIBIT NODE 1 B HEATERS WITH TWO TEMP SENSORS

NOTE

For Node 1 heaters with two temperature sensors, the heater must be inhibited prior to changing setpoints and failure limits. If the heater is not inhibited, the heater FDIR may consider the heater failed after setpoints and failure limits for one of the two temp sensors has been changed.

sel Node 1 Htr 1 --- 6 (Node 1 Htr 7 --- 9) Availability

Node1 Htr 1-6 (Node 1 Htr 7-9) Availability

sel Node 1 Htr[X]B [X] = 1 3 5 6 7

cmd Node 1 Htr[X]B - Inhibit
√Node 1 Htr[X]B Availability - Inh

Repeat

3. MODIFY SETPOINTS FOR ALL PMA 1 HEATER TEMPERATURE SENSORS

NOTE

PMA 1 Heaters 2A and 4B are not active and do not appear on the PCS NODE 1 TCS Display.

sel PMA 1 HtrA(B) setpoints

PMA1 HtrA(B) setpoints

sel PMA 1 Htr[X(Y)]A(B) Change Setpoints [X] = 1 3 4 5

[Y] = 1 2 3 5

NOTE

Specific values to be entered in the template command below for each PMA 1 temperature sensor are provided in Table 1 - PMA 1/Node 1 Heater Configuration Table. Values are provided for each of the five items in the template: Upper Setpoint, Failure Upper Limit, Lower Setpoint, Failure Lower Limit, and Cyclic Load Delta.

sel Upper Setpoint
Failure Upper Limit
Lower Setpoint
Failure Lower Limit
Cyclic Load Delta
Setpt Change **Execute**

√PMA1 Htr[X(Y)]A(B) Upper Setpoint
√Failure Upper Limit
√Lower Setpoint
√Failure Lower Limit
√Cyclic Load Delta

Repeat

4. MODIFY SETPOINTS FOR ALL NODE 1 HEATER SENSORS
sel Node 1 HtrA(B) setpoints

Node1 HtrA(B) setpoints

sel Node 1 Htr[X]A,B Change Setpts

[X] = 1 2 3 4 5 6 7 8 9

NOTE

1. Specific values to be entered in the template command below for each Node 1 temperature sensor are provided in Table 1. Values are provided for each of the five items in the template: Upper Setpoint, Failure Upper Limit, Lower Setpoint, Failure Lower Limit, and Cyclic Load Delta.

2. As depicted on the PCS NODE 1 TCS display, certain Node 1 heaters have two temperature sensors (heaters 1A, 1B, 3A, 3B, 5A, 5B, 6A, 6B, 7A, and 7B). For these heaters, setpoints for both temperature sensors must be changed. Values for both sensors are provided in the Table 1.

sel Upper Setpoint
Failure Upper Limit
Lower Setpoint
Failure Lower Limit
Cyclic Load Delta
Setpt Change **Execute**

√Nod1 Htr[X]A,B Upper Setpoint
√Failure Upper Limit
√Lower Setpoint
√Failure Lower Limit
√Cyclic Load Delta

Repeat

5. ENABLE TO BACKUP PMA 1 AND NODE 1 A HEATERS

NOTE
PMA 1 Heater 2A is not active and does not appear on the PCS NODE 1 TCS Display.

sel PMA 1 Htr (Node 1 Htr 1 --- 6) (Node 1 Htr 7 --- 9) Availability

PMA1 Htr (Node1 Htr 1-6) (Node 1 Htr 7-9) Availability

sel PMA 1 (Node 1) Htr[X]A [X] = 1 3 4 5

[Y] = 1 2 3 4 5 6 7 8 9

cmd PMA 1 (Node 1) Htr[X]A - Ena Backup

√PMA 1 (Node 1) Htr[X]A Availability - Ena BU

Repeat

6. ENABLE TO OPERATE NODE 1 B HEATERS WITH TWO TEMP SENSORS

sel Node 1 Htr 1 --- 6 (Node 1 Htr 7 --- 9) Availability

Node1 Htr 1-6 (Node 1 Htr 7-9) Availability

sel Node 1 Htr[X]B [X] = 1 3 5 6 7

cmd Node 1 Htr[X]B - Ena Backup

√Node 1 Htr[X]B Availability - Ena BU

Repeat

TABLE 1 - PMA 1/NODE 1 HEATER CONFIGURATION TABLE
POST DRY-OUT HEATER RECONFIG

PMA 1 HEATERS (ALL TEMPS IN °C)

HEATER (SENSOR)	AVAIL-ABILITY	UPPER SETPOINT	FAILURE UPPER LIMIT	LOWER SETPOINT	FAILURE LOWER LIMIT	CYCLIC LOAD DELTA
1A	Ena BU	-7	45	-9	-12	0
1B	Ena Opr	-7	45	-9	-12	0
2B	Ena Opr	-1	45	-4	-7	0
3A	Ena BU	4	45	-2	-5	0
3B	Ena Opr	4	45	-2	-5	0
4A	Ena BU	10	45	7	4	0
5A	Ena BU	21	45	18	16	0
5B	Ena Opr	21	45	18	16	0

NODE 1 HEATERS (ALL TEMPS IN °C)

HEATER (SENSOR)	AVAIL-ABILITY	UPPER SETPOINT	FAILURE UPPER LIMIT	LOWER SETPOINT	FAILURE LOWER LIMIT	CYCLIC LOAD DELTA
1A (Snsr 1)	Ena BU	-30	45	-33	-34	0
1A (Snsr 2)		-30	45	-33	-34	0
1B (Snsr 1)	Ena Opr	-30	45	-33	-34	0
1B (Snsr 2)		-30	45	-33	-34	0
2A	Ena BU	-30	45	-33	-34	0
2B		-30	45	-33	-34	0
3A (Snsr 1)	Ena BU	-30	45	-33	-34	0
3A (Snsr 2)		-30	45	-33	-34	0
3B (Snsr 1)	Ena Opr	-30	45	-33	-34	0
3B (Snsr 2)		-30	45	-33	-34	0
4A	Ena BU	-30	45	-33	-34	0
4B	Ena Opr	-30	45	-33	-34	0
5A (Snsr 1)	Ena BU	-30	45	-33	-34	0
5A (Snsr 2)		-30	45	-33	-34	0
5B (Snsr 1)	Ena Opr	-30	45	-33	-34	0
5B (Snsr 2)		-30	45	-33	-34	0
6A (Snsr 1)	Ena BU	-30	45	-33	-34	0
6A (Snsr 2)		-30	45	-33	-34	0
6B (Snsr 1)	Ena Opr	-30	45	-33	-34	0
6B (Snsr 2)		-30	45	-33	-34	0
7A(Snsr 1)	Ena BU	-30	45	-33	-34	0
7A (Snsr 2)		-30	45	-33	-34	0
7B (Snsr 1)	Ena Opr	-30	45	-33	-34	0
7B (Snsr 2)		-30	45	-33	-34	0
8A	Ena BU	-30	45	-33	-34	0
8B	Ena Opr	-30	45	-33	-34	0
9A	Ena BU	-30	45	-33	-34	0
9B	Ena Opr	-30	45	-33	-34	0

3A NODE 1/PMA 1 MANUAL HEATER OPERATIONS

1. COMPARE SHELL TEMP(S) TO LIMITS AND POWER HEATER ON/OFF

NOTE
For Node 1 heaters with two temperature sensors, each temperature reading should be compared to the limits for that specific sensor in order to decide whether to turn the heater on or off. If all temperature sensors in a zone have failed then sensors in adjacent zones may be used.

PCS

Node 1: TCS

NODE1: TCS

Note PMA 1 (Node 1) Htr[X]A(B) Temp

sel PMA 1 (Node 1 Htr 1 --- 6)(Node 1 Htr 1 --- 7) Availability
sel PMA 1 (Node 1) Htr[X]A(B) Setpoints

PMA1(Node1) Htr[X]A(B) Setpoints

Note PMA 1 (Node 1) Htr[X]A(B) Lower Setpt
Note PMA 1 (Node 1) Htr[X]A(B) Upper Setpt

If PMA 1 (Node 1) Htr[X]A(B) Temp < PMA 1(Node 1) Htr[X]A(B) Lower Setpoint

sel PMA 1 (Node 1 Htr 1 --- 6) (Node 1 Htr 1 --- 7) Availability
sel Htr[X]A(B) Htr Power

RPCM [..] Htr[X]A(B)

If RPC - Tripped

√**MCC-H**

√Close Cmd - Ena
cmd Close
√Position - Cl

If PMA 1 (Node 1) Htr[X]A(B) Temp > PMA 1 (Node 1) Htr[X]A(B) Upper Setpoint

sel PMA 1 (Node 1 Htr 1 --- 6) (Node 1 Htr 1 --- 7) Availability
sel Htr[X]A(B) Htr Power

RPCM [..] Htr[X]A(B)

If RPC - Tripped

√**MCC-H**

√Open Cmd - Ena
cmd Open
√Position - Op

2. REPEAT HEATER POWER ON/OFF CYCLES AS REQUIRED
   Repeat step 1 after TBD hours.

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